



Data Literacy at the interface of higher education and business

DATALIT Project

Lessons Learnt and Further Recommendations

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Table of Content

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Learning to use data is pop(ular)	2
Key Findings / What is data literacy?	3
What skills make a person data literate?	4
Data literacy in existing skills validation systems	5
Few interesting cases	5
LEVEL5 Methodology and Piloting Data Literacy Courses	7
Final Remarks and Further Inspirations	10
Inspirations for other Erasmus+ projects	11

Learning to use data is pop(ular)

Learning to use data is becoming an increasingly popular goal day by day. It is for those who would like to work better as a professional or consultant, but also for companies that have been overwhelmed in recent years by an almost obsessive communication on Big Data and Artificial Intelligence, as polar stars to make work processes more effective or functional. However, what we noticed in the DATALIT project is that there is a huge gap between the most widespread training offered, such as courses in Data Science, and the initial training needs like the basic skills in Data Literacy. Those who want to learn how to use data and are looking for courses, find the advanced ones very easily but not the basic ones that allow you to enter the world of data in small steps, perhaps even starting from the ability to better read the data themselves, or graphs, or even personal data, those of the pedometer that is used to monitor physical activity, those of the shopping receipt, or books read, those of the coronavirus pandemic that reach us every day through the media. The main challenge for the DATALIT project was precisely this: starting from helping people to understand and use daily data better, because it is a skill that can be useful to anyone, regardless of whether in the future they want to work as data scientist or not. Data is not something for insiders and that's it, because everyone can (and many must) learn to understand them better. All this basic approach pushed us to make the world of data more and more "pop" or "popular" as well as we are interested in understanding the context in which we operate better and better..

During the DATALIT project the consortium realized:

- a wide research to highlight needs and expectancies in universities and companies
- an analysis of the educational offers at European level
- a design of the competences framework
- a series of data-driven courses
- a series of pilots to test the general approach and methodology

Companies, university teachers, professionals and students could use this report to understand how much opportunities could be entailed by learning data, most largely than acquiring "only" Data Science advanced skills.

DATALIT is a project funded under Erasmus+ Programme, promoted by the European commission, and developed as a “*Knowledge Alliance*”, under the coordination of the CNR-ITD (lit.: Institute for Educational Technology of the National Research Council of Italy). The project stands thanks to the collaboration of 14 European partners, with the aim of identifying a transversal didactic curriculum of skills on data literacy, validating it, and then creating a certification framework for these skills.

The research phase included:

- a desk research work on companies and university curriculum in 19 European countries
- an online questionnaire that received 704 analysable responses
- a series of face to face interviews, each one with at least 4 participants

All the research has been coordinated by the consortium member *Universidade Nova de Lisboa*.

Key Findings / What is data literacy?

Research shows that the concept of data literacy is unclear and does not have a common meaning across Europe. In many countries, such as Belgium and Serbia, there is not even a satisfactory term to describe it. In others, such as Austria, Germany and Italy, a translation exists on paper but is little used and the term remains obscure to most.

Furthermore, it has been found that, in practice, the concept of data literacy is associated with other types of competences that come close to it, but are not quite the same thing. Thus, instead of the words “data literacy”, others have often been used that refer to concepts intertwined with data literacy, but not entirely superimposable. For instance:

- ‘digital literacy’,
- ‘information literacy’,
- ‘media literacy’,
- ‘statistical literacy’,
- ‘computer/IT literacy’, v. finland

This lack of clarity on the meaning of "data literacy" is not just a theoretical problem: it has an impact on the world of work and of education.

For HR departments, who fail to accurately describe the skills they need to identify in candidates. For example, if you search for the term "data literacy" in search engines dedicated to job vacancies, very few associated jobs appear. Yet, being "data literate" is fundamental in many occupations, in addition to those more properly dedicated to data science. Just think of the importance of data literacy for administrative or accounting roles, in which knowing how to handle data and spreadsheets is a strong, if not essential, asset.

For universities and other training institutions, which, in the absence of a clear concept of data literacy, limit data training to specialized courses, for example in Data Science or IT. In this way, they are unable to meet the need for curricula with basic skills on data in disciplinary fields outside those of data science.

For workers, who, in the absence of clear definitions and expectations, do not find certification systems to validate their skills, and sometimes not even commonly known terms to describe them.

What skills make a person data literate?

From the comparative analysis of the 19 countries considered by desk research, it emerges that some of the skills most commonly associated with data literacy are:

- Knowing how to understand in which situations it is convenient to use data.
- Knowing how to correctly read visualizations of different data, from tables to graphs.
- Knowing how to critically interpret the information derived from a data analysis.
- Know what methods and tools exist to do different types of data analysis and know when and how it is convenient (not) to use them.
- Knowing how to recognize if the data has been manipulated or misinterpreted.
- Knowing how to communicate data and do data storytelling.

In the online questionnaire, which was answered by 704 people residing in different countries of the world, the skills considered most important are those associated with

knowing how to find data and knowing how to process them to create rules and classifications.

Data literacy in existing skills validation systems

The confusion about the meaning of data literacy and its relationships with other forms of literacy, such as digital literacy or numerical literacy, can also be found by analysing the various systems of certification of competences, both at European and national levels.

At the European level, the main reference framework is the Digital Competence Framework (DigComp), whose first area of expertise is dedicated to "Information and Data Literacy", in turn divided into 3 categories, each defined on the basis of 4 levels of mastery.

- 1. Browse, search and filter information and digital content**
- 2. Evaluate data, information and digital content**
- 3. Manage data, information and digital content**

In addition to this reference framework, however, there is no European certification system to certify these skills.

Few interesting cases

In some European countries, assessment and certification systems based on the framework offered by DigComp have been developed:

- **Pix Framework (France):** Based on DigComp, Pix is a public online service for the assessment, development and certification of digital skills. It includes 5 areas of expertise, one of which is dedicated to "Information and data".
- **Data Capability Strategy e National Data Strategy (UK):**

Although there is no specific certification system, the UK government has launched a series of initiatives which aim to make its citizens data literate. With the "Data Capability

Strategy"¹ (2013) and with the "National Data Strategy"² (2019), the UK government underlined the importance of investing in the data economy and providing access to high quality data, while ensuring that citizens, companies and organizations are trained enough to be able to work efficiently with this data.

¹ <https://www.gov.uk/government/publications/uk-data-capability-strategy>

²

[https://www.gov.uk/government/publications/uk-national-data-strategy#:~:text=The%20National%20Data%20Strategy%20\(NDS,public%20trust%20in%20data%20use.](https://www.gov.uk/government/publications/uk-national-data-strategy#:~:text=The%20National%20Data%20Strategy%20(NDS,public%20trust%20in%20data%20use.)

LEVEL5 Methodology and Piloting Data Literacy Courses

Starting from those evidences, the consortium worked to create a competence framework based on the LEVEL5 methodology. Designed on 5 levels of competences acquisition, divided in three pillars (Knowledge, Skills, Attitudes), the LEVEL5 methodology has been tailored by each consortium members starting from a common ground and approach, as represented in the following schema:

Each consortium member created its own course to be piloted with its specific target group. Below a series of short descriptions of what partners have done for their personalized learning pathways.

NOVA Information Management School (IMS) and INOVA+, Portugal: NOVA IMS provided a short course on Data Management and Information and Knowledge Management for its Bachelors' and Masters' students. INOVA+ represented the business side of the course and was responsible for the proposal of a challenge for students to solve using their prior and acquired knowledge throughout the course. This online course was covered under the DATALIT project co-funded by the ERASMUS+ Programme of the European Union. The course materials were provided using the Padlet tool and in three online sessions via the Microsoft Teams platform. These sessions occurred between 20th May 2021 and 30th June 2021. This course required more than 20 hours of effort distributed in one month and was 100% self-learning. At the end of the course, the students presented their solutions to the business challenge in a three-minute pitch. Finally, the course was self-assessed by the students, with the support of dedicated expert tutors.

University of Novi Sad and PanonIT, Serbia: The University of Novi Sad and PanonIT delivered a course on E-business through digital platform MS Teams and Canvas to Industrial Engineering and Management students during the spring semester of the academic year 2020/21. This online course is covered under the DATALIT project, funded as Knowledge Alliance under the Erasmus+ Program by the European Commission. Students learned how to "Read and Create Data Visualization" with the spreadsheet

software MS Excel during the course. This course required 24 hours of effort distributed in nine weeks. The LEVEL5 assessment methodology was used for evaluation.

Vilnius University (Lithuania) and Lithuanian Confederation of Industrialists: Vilnius University invited students to improve their data literacy competences and participate in Datalit project, funded by the ERASMUS+ Programme of the European Union. The project aimed to improve students' knowledge and the ability to use time trends and forecasts for various research and enterprise purposes. It developed a clear plan of steps, during which the students acquired the necessary attitudes, skills and knowledge needed to exercise this competence in a quality manner. Students had the opportunity not only to engage in learning processes, but also to test their skills practically, and some of the activities were organized by the Lithuanian Confederation of Industrialists. The results showed increased understanding and usage of various time trends and forecasting methods and approaches across higher education and beyond.

Smart Revolution S.R.L. (Italy): Smart Revolution provided a learning offer on data visualization for its staff, especially interns and new employees, from June to September 2021. The learning projects were highly individual and based on the learner's previous knowledge and interests. Staff members could gain their theoretical knowledge through data visualization modules available on the DATALIT platform as well as through synchronous lessons, in partnership with University of Palermo. Then, they applied their acquired knowledge into practice developing a data visualization report of the activities of the company, infographics to support dissemination activities and a learning kit for future learners. This proved to have a significant added value to the company's daily activities, improving its communication potential.

Dataninja srls (Italy) - Dataninja worked in collaboration with the University of Bologna with a class of 26 students with a curriculum on Digital Humanities. The training has been managed with a fully online plan of six lessons. During the first part of the course the teachers shared with students the fundamentals of data visualization with the help of a hands-on workbook. During the second part students have been asked to create their own project works for selecting, analyzing and visualizing data with specific insights. Students experienced a series of techniques of working with data from the use of

spreadsheets to the experimentation of different digital visualization tools, discovering new ways of extracting and communicating data. Lessons have been managed through the Datalit elearning platform. Moreover, using a flipped classroom methodology, students experienced a process of collective peer review of their work and gained 6 University credits (ECTS) once finished. Please see more at this presentation.

Evodevo srl (Italy) - Evodevo provided a course on open data based infographics using Tableau Software such as Tableau Desktop and Tableau Online, offered to its staff and external students. This online course is covered under the DATALIT project, funded as Knowledge Alliance under the Erasmus+ Program by the European Commission. Students learned how to find and get open data; how to clean, enrich and manipulate them; how to use data discovery in order to find regularities and anomalies; how to create infographics and how to publish them on the web. This course required more than 110 hours of effort distributed in four months, including workshop and infographics development support by tutors. The Datalit Moodle platform was used to collect videos, texts and evaluation quizzes. The LEVEL5 assessment methodology was used for evaluation. Finally, the course was self-assessed by the students, with the support of dedicated expert tutors.

Final Remarks and Further Inspirations

Data literacy skills are highly requested in all work sectors, even outside those related to the digital world and data science. Yet, at European level there is no certification system for basic skills on data. The first phase of DATALIT research revealed that in all the countries studied, university training on data is the prerogative of advanced courses, related to information technology, data science and sometimes social studies. In addition to these subject areas, graded university curricula generally do not offer transversal courses in basic data-related skills.

The need for a shared system of validation and certification of data literacy skills has also clearly emerged from the online questionnaires. Participants' responses highlighted a problematic gap. On the one hand, there was an interest in the development of data literacy skills, both on the part of organizations and companies that promote them for their employees or students, and on the part of the latter who recognize their importance for personal and professional reasons.

On the other hand, the questionnaires show that the desire for these skills does not find tools to fully express itself in an efficient and structured way:

- **Companies and organizations lack tools and methodologies to promote data literacy training among their employees / students.** In particular, there was little use of university courses, traineeships outside or inside one's own company, and internal or external training. In fact, between 38% and 59% of participants say that their organization does not use any of these methodologies. As for digital tools, 70% of participants use forms of e-learning or blended learning to acquire skills in their organization (especially in the form of video conferences), but as many as 65% have never used MOOCs, which are also excellent tools, often free, for this purpose.
- **Companies and organizations do not have tools to evaluate and validate the data literacy skills acquired by their employees / students.** According to 64% of survey respondents, their organization does not validate the data literacy skills acquired by their employees or students. Among the participants belonging to organizations that instead have a validation system, 47% of the participants reported that this system does not adopt any recognized framework (such as

DigComp).

- **Many questionnaire respondents have never heard of the main European frameworks for competency assessment**, a figure ranging from 77% to 90% according to the framework.

In this context the piloting phases of the DATALIT project engaged hundreds of students and professionals at European level showing on one hand the need and the feasibility of such a educational learning pathways, on the other hand the large interest of participating learners that have had the opportunity to improve their soft and hard skills together in such a cross sectorial field of education that entails competences from communication, to data managing, from graphic to storytelling.

Inspirations for other Erasmus+ projects

The lessons learnt from the DATALIT project are helping consortium members in their further projects and activities. In particular some partners teamed up for further collaborations for other initiatives funded within the Erasmus+ program such as:

- DEDALUS project, to foster data literacy among university students. Website: <https://dedalus.pa.itd.cnr.it/>
- DALFYS project, to foster data literacy among school teachers through the LEVEL5 methodology for managing the competence framework. Website: <https://www.dalfysproject.eu/>
- DATA LITERATE project, to train school teachers regarding data literacy and allow them to teach it among their students at secondary schools. Website: <https://www.dataliterateproject.eu/>
- JOULE project, to design and create courses focused on Data Journalism for European HE institutions, that will be accessible online for free. Website: <https://jouleproject.eu/>

All of those additional initiatives are managed by different DATALIT partners (e.g., CNR, Dataninja, UNL, Bupnet, INOVA+, Vilnius University) to strengthen the work on this topic and enlarge the network of stakeholders.