D1.4 DATA MANAGEMENT PLAN

Project acronym: OTTER

Project title: Outdoor Science Education for a Sustainable Future

Call: H2020-SwafS-2018-2020

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OTTER project

Funded under the EU's Horizon 2020 research and innovation programme, **OTTER** aims to **enhance the understanding of Education Outside the Classroom** (EOC) **methods and pedagogies** and how they can help **improve the acquisition of scientific knowledge and transferable skills in students**, **specifically in the field of environmental sustainability and the reduction of plastic waste**. It aims to increase interest in scientific topics among young people, while also contributing to the range of innovative educational projects and the increase of scientific citizenship within the EU.

OTTER aims to strengthen educational outside-the-classroom (EOC) **networks within Europe**, connecting experts from four different regions within the continent (**Finland, Hungary, Ireland, and Spain**). The strengthening of these networks will be utilised to carry out a programme of EOC pilot schemes and analysis of the effect they have on the performance of participating students, including their levels of sophisticated consumption and scientific citizenship, to increase understanding of the effects of education outside the classroom on EU citizens. The pilot schemes will share a common theme revolving around issues of plastic waste and recycling to build upon recent momentum in tackling related global educational, social, and environmental issues and due to the close relationship between reducing plastic waste and the need for more sophisticated consumers.

Project Consortium

Geonardo Environmental Technologies **(GEO)**

European Science Foundation **(ESF)**

University of Groningen **(RUG)**

University of Limerick **(UL)**

Bridge Budapest **(BB)**

Learning Scoop - oppimisen osuuskunta **(LS)**

The Big Van Theory **(TBVT)**

Center for the Advancement of Research & Development in Educational Technology **(CARDET)**

1. Executive Summary

The data management plan is a dynamic document and essential to the life cycle of a project since it describes how data will be collected, processed, stored, and shared. With these various steps in mind and compliance with Horizon 2020 guidelines[1], OTTER data will follow the principles of FAIR[2] (findable, accessible, interoperable, and re-usable) data.

This deliverable thus outlines how and what data will be collected, how data will be processed and stored, which and how data will be made open, and how data will be selected and preserved during and after the project. This document is built on the Horizon 2020 guidelines and complements *D4.1 Monitoring and Evaluation Framework, D6.1 Dissemination Plan* and Ethics deliverables D7.1 (Humans) and D7.2 (POPD).

This deliverable's structure consists of

- Data summary,

- FAIR data,

- Allocation of resources,

- Data security,

- Ethical aspects.

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[1] https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/data-management_en.htm
[2] Wilkinson, M. D., Dumontier, M., Aalbersberg, I. J., Appleton, G., Axton, M., Baak, A., ... & Mons, B. (2016). The FAIR Guiding Principles for scientific data management and stewardship. *Scientific data*, *3*(1), 1-9.

2. Data summary

OTTER aims to understand how education outside the classroom methods and pedagogies can help improve the acquisition of scientific knowledge and transferable skills in students, specifically in environmental sustainability and the reduction of plastic waste. Because OTTER evaluates products, processes, and relationships related to this primary goal, the data coming from the project needs to be constituted by multiple sources of evidence, each of them with its specificity and approaching a mixed (qualitative and quantitative) research perspective: questionnaires, interviews, ethnographic observations and document analysis.

As described in *D4.1 Monitoring and Evaluation Framework*, OTTER will collect qualitative as well as quantitative data. The former comprises interviews with individuals and stakeholder groups, field notes from direct observation during the pilots and case studies such as best practice cases. The latter comprises EOC initiatives centred around students involved in STEAM education. The data will refer to educational practices and behavioural changes, improvement of knowledge and skills. This collection of quantitative data is a crucial element in establishing baselines for validating the success of the four pilots.

We expect to collect data from a diverse audience and can compose a dataset of at least 800 individuals. The research data produced by OTTER includes anonymized and pseudo-anonymized questionnaire responses, notes from ethnographic observations, videos and notes from interviews and focus groups and textual data (such as school activities). All data (including video and image data) will be handled only by a restricted group of people within the project to anonymize and pseudo-anonymize them for processing analyses (see *D4.1 Monitoring and Evaluation Framework*). These data will be stored in *.cvs, .txt, .odt, .pdf,* and *.mp4* type files for further analysis. Table 1 shows an overview of how the research data will be collected (origin) and its types and formats to be stored.
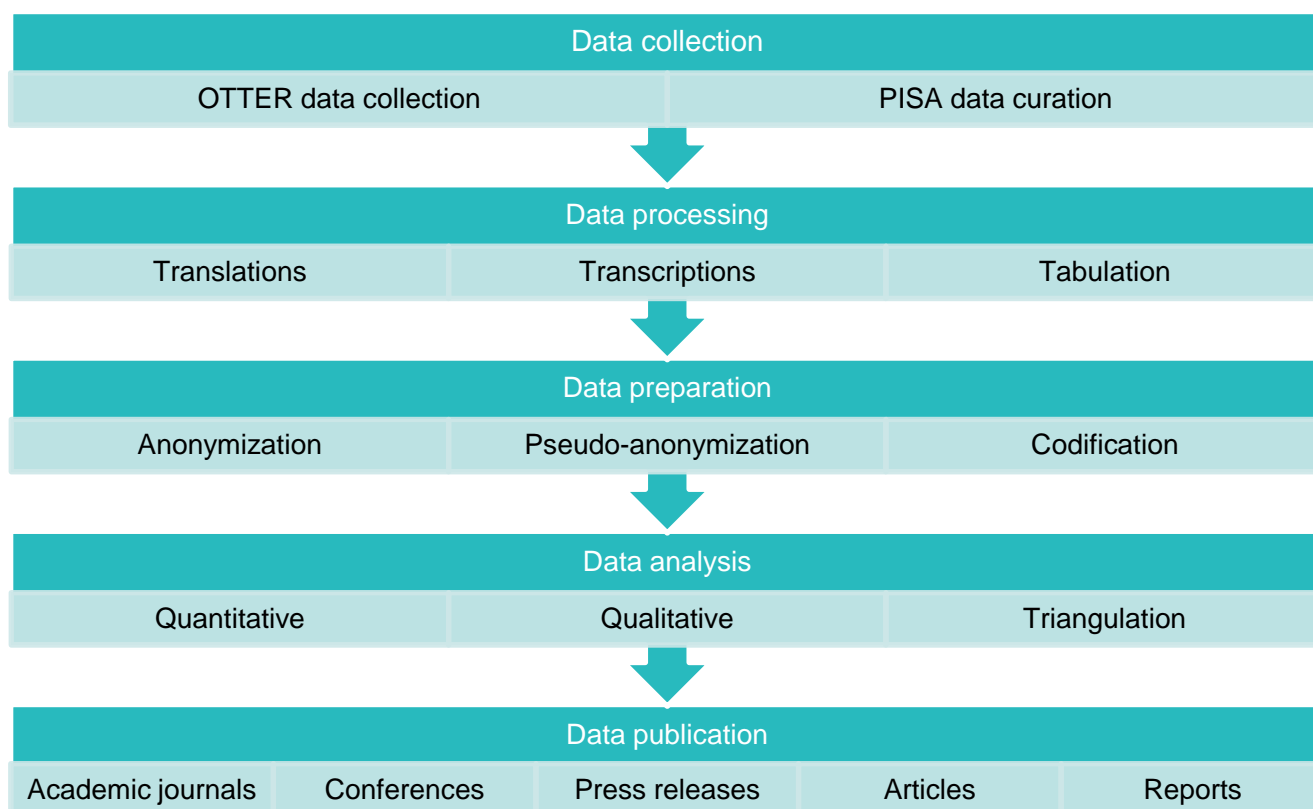
Table 1. Overview of OTTER research data.			
Target	**How will the data be collected?**	**In which format will the data be?**	**What personal data will be collected?***
Students	- Observation during OTTER Outdoor Lab - Interviews or focus groups conducted by OTTER researchers - Analysis of school activities - Questionnaires	- Text (.txt, .odt, .doc) - Video/audio (.mp4), and text (.txt, .odt, .doc) - Digitized documents (.pdf) - Text (.txt) and tables (.cvs)	Age, gender, name of school, and country
Teachers	- Questionnaires - Interview or focus group conducted by OTTER researchers - Texts from the project's virtual platform (OTTER EOC Hubs) - Observation of activities conducted by teachers	- Text (.txt) and tables (.cvs) - Video/audio (.mp4), and text (.txt, .odt, .doc) - Text (.txt, .odt, .doc) - Text (.txt, .odt, .doc)	Age, gender, name of school, and country
Parents	- Questionnaires - Interview or focus group conducted by OTTER researchers	- Text (.txt) and tables (.cvs) - Video/audio (.mp4), and text (.txt, .odt, .doc)	Name of child's school, gender, and country
Stakeholders (e.g., researchers, members of the public)	- Questionnaires - Interview or focus group conducted by OTTER researchers	- Text (.txt) and tables (.cvs) - Video/audio (.mp4), and text (.txt, .odt, .doc)	Occupation, gender, and country

*This will be informed in the consent and assent terms used during data collection for OTTER research. See *Ethical aspects* sections for more details.

In addition to these data, the OTTER analysis activities also foresee the use of educational metadata from PISA. This data is already open access[3] and will be considered for comparisons regarding the domain of scientific literacy. It is expected to have about 1 TB of files in total, to be stored on HD of the partner institutions and in the online cloud, both protected by passwords with restrict access (see *Data security* section).

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[3] https://www.oecd.org/pisa/data/

As indicated in the consent form, the research data will be available as openly published reports and research papers and interest researchers, policymakers, educators and project developers focused on EOC. The Figure 1 summarizes the five major steps in the life cycle of the data collected for the OTTER project.

Data collection	
OTTER data collection	PISA data curation

Data processing		
Translations	Transcriptions	Tabulation

Data preparation		
Anonymization	Pseudo-anonymization	Codification

Data analysis		
Quantitative	Qualitative	Triangulation

Data publication				
Academic journals	Conferences	Press releases	Articles	Reports

Figure 1. Overview of the life cycle of the data collected for the OTTER project.

In addition to this research data, the OTTER team responsible for the dissemination and communication plan will monitor the impact of the project's activities online, tracking numbers of followers on different platforms (Twitter, Instagram, Facebook, YouTube, LinkedIn and TikTok) and interaction data such as shares and likes (see *D6.1 Dissemination Plan*). This monitoring is under the General Data Protection Regulation (GDPR) and will not retain any IP or personal data.

3. FAIR data

In order to establish practices that prevent data loss and increase data reuse, the data generated by OTTER activities are aligned with FAIR principles (Findable, Accessible, Interoperable, Reusable)[4], as described next.

3.1 Making data findable, including provisions of metadata

For purposes of the internal organization of the project team that will be working with the data analysis, all data will have an associated metadata document (stored as a .txt files) that describes critical aspects of the data.

The data produced by OTTER will preferably be available in the form of reports and scientific papers to be deposited in repositories that use DOI. However, considering that DOI needs to be relegated by DOI registrants through a DOI registration office[5], when necessary, OTTER reports may also be deposited in open access platforms that have DOI, such as Zenodo[6].

In addition, all outputs derived from OTTER will be available on the project website (https://otter-project.eu/) and may also be made available in the scientific output directory of the University of Groningen (https://research.rug.nl/).

The keywords used for the publications of reports, articles and eventual datasets will follow the exact search words used for research publications in EOC and STEAM education.

3.2 Making data openly accessible

Considering the diversity of data collected by OTTER in the form of questionnaires, interviews, focus groups, and documents produced in the project context and in compliance with ethical requirements (see *Ethical Aspects* section), no data containing identifying information about project participants will be made openly available because data will be anonymized and pseudo-anonymized in the data preparation step (Figure 1). Also, data covered by confidentiality, such as school activities and internal project documents, will not be made available. All personal data processed for the project will be kept closed and inaccessible to third parties.

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[4] According to https://www.go-fair.org/fair-principles/
[5] See https://www.doi.org/doi_handbook/8_Registration_Agencies.html
[6] See http://help.zenodo.org/highlights/

In cases where data are required for scientific publications or peer-review processes, only data previously processed by the University of Groningen research team through the anonymization process will be made available. In those cases, all OTTER research data can be accessed and processed using open access and free software's, including statistical software (such as R[7] and JASP[8]), as it will be primarily in the format of *.cvs* tables and *.txt* texts.

The data sets can be made openly available only after the academic publications foreseen in the OTTER proposal (see *D6.1 Dissemination plan*). OTTER's ethics committee will decide how to share the processed data, ensuring compliance with what has been previously approved by the ethics and research committees of the partner institutions, in this case, the University of Groningen.

3.3 Making data interoperable

Research data published through scientific journals, reports, conferences, press release, articles and eventually databases will be made available in the form of Creative Commons licenses[9]. As stated in the OTTER documentation of Ethical procedures, all identifiable personal information from project participants will be restricted to the data collection and analysis team and will not be shared with third parties.

If the processed data will be shared with a third party after the OTTER Ethics Committee has decided, detailed metadata instructions will be made available describing the origin of the information and its meaning according to the vocabularies of the EOC and STEAM field. Where data needs to be accessed by third parties after anonymization, the use of open-access software and open publication will ensure that third parties can reuse OTTER data.

The principles outlined in this document will be maintained throughout the duration of the project, and data will be stored for up to 10 years in accordance with RUG guidelines[10].

3.4 Increase data reuse (through clarifying licenses)

The data produced in the context of OTTER activities will be made accessible after being organized by the data collection and analysis team, and some conclusions and implications have

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[7] Free Software https://www.r-project.org/

[8] Open-source project supported by the University of Amsterdam https://jasp-stats.org/

[9] See https://creativecommons.org/licenses/

[10] See https://www.rug.nl/research/research-data-management/tools-services/rdmp/

been drawn from them that deserve to be disseminated to the scientific community, educators and the education community.

If the processed data are published, they will be made available 6 months after the main publications. In this case, the datasets will also be made available under the CC-BY license and in repositories that use DOI as Zenodo.

Concerning licensing, this will occur by publishing under the CC-BY license[11], which allows share and adapt, does not limit the time of use of the information, leaving it reusable as long as the sources are cited.

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[11] See https://creativecommons.org/licenses/by/4.0/

4. Allocation of resources

Geonardo, as the project coordinator, together with the Ethics and Data Management Committee of OTTER, will have the overall responsibility for the data management in the project and will be in charge of the coordination and supervision of the OTTER DMP. WP leaders will be responsible as data processors to ensure that these management guidelines are followed. The researchers in charge of processing, analyzing and publishing the research data (RUG and UL) will be primarily responsible for maintaining the FAIR data.

The entry point to the project's communication and dissemination activities will be the OTTER website acting as the project's main channel providing the public and the specific target groups access to results. The development of the website has been undertaken by Geonardo (technical development and administration) with the cooperation of all partners (content development). The website will be regularly updated to ensure the provision of most recent and relevant project information to the visitors (including scientific publications and reports).

Partners have been allocated the necessary staff effort for data management activities within the framework of WP1, whereas costs for other goods and services have been planned under WP7 for dissemination, publications and providing open access to scientific publications and data.

The publications of the research data analyzed by the University of Groningen team will be financed by the university because of agreements between the scientific publishers and the Dutch universities[12]. In addition, in case of the datasets are published, the storage in DOI directories as the Zenodo is free of charge.

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[12] See http://www.unesco.org/new/en/communication-and-information/portals-and-platforms/goap/access-by-region/europe-and-north-america/netherlands/ and https://www.openaccess.nl/en/in-the-netherlands

5. Data security

Data collected by the project will be shared only by the collection and analysis team in the project's internal online repository to prevent data loss. OTTER consortium participants will be responsible for preventing that the repository is accessed by third parties or that data is shared. During the trainings for data collection and analysis (see *D4.1 Monitoring and Evaluation Framework*) this will be reinforced with all staff. After the data has been collected, the raw data will be copied into the internal environment of the University of Groningen.

Data that cannot be published will be stored in the participating institutions that have their own security mechanisms. The research data will be processed in the internal online environment of the University of Groningen, with local and online copies. The directory is only accessible by passwords, with multiple layers of protection, which will ensure not only security against data loss but also the privacy of the research participants.

6. Ethical aspects

A dedicated work package (WP7) has been drawn up for managing the ethics issues in OTTER and ensure that OTTER collection and data management are based on the principles of confidentiality (to prevent unauthorized data from being shared), integrity (to ensure that data is not modified), and availability (to make the information available to authorized persons).

Since OTTER will involve human participants in its data gathering via questionnaires, interviews, ethnographic observations of participants' engagement in activities, their customs and cultures, "Humans" and "Protection of Personal Data" were identified as relevant ethics issues before the start of the project. To address these, an Ethics and Data Management Committee (EDMC) has been set up during the kick-off phase of the project. The Committee is responsible for overseeing how the research data are managed throughout the project and to make sure that the research complies to all Personal Data laws and research Ethics regulations. The EDMC has an overall guidance and monitoring role, setting up the data management rules for the project and overseeing their implementation by the individual partners. One of the main tasks of the Committee is to ensure that the participants' information sheets, the consent forms, and the assent forms are properly distributed, signed, and securely stored throughout all data collection and analysis.

The Chair of the EDMC is Prof. Lucy Avraamidou (RUG) who is leading the process of developing a set of guidelines and forms (consent and assent forms) to be translated and used by each partner

as part of the research activities of the project (see *D4.1 Monitoring and Evaluation Framework*). These guidelines are developed under the guidance and supervision of the Research Ethics Committee (CETO) of the Faculty of Arts, University of Groningen. The CETO examines applications taking into consideration EU and national laws, rules, and regulations of each country involved (e.g., GDPR, Academic Integrity, Code of conduct for research integrity, National Ethics Consultation Social and Behavioural Sciences) and is composed of researchers who have sufficient experience and expertise in ethics, data protection, and data management in research and science. The Ethics and Research Committee of RUG is not responsible for examining applications of all beneficiaries but only the application of RUG, which, upon approval is translated into the national languages of the partners and submitted to each country's Ethics and Research Committee.

Approval to research in the OTTER context was obtained by applying to the CETO (Proposal #85494053), liberated on 20 January 2022. The CETO has established that the research protocol follows internationally recognised standards to protect the research participants (see *D4.1 Monitoring and Evaluation Framework*). Ethics deliverables D7.1 (Humans) and D7.2 (POPD) provide the necessary details in terms of the handling of the ethics issues in OTTER.

In addition to these considerations, as stated in *D4.1*, during the *WP4 Evaluation and Monitoring* activities, the consortium partners will be informed about the measures needed to ensure the privacy of the research participants, the security of the data and the approved ethical requirements.

7. Final Considerations

This document presented the principles that will guide the data management of the OTTER project. In addition, we indicated that the consortium will publish its results openly and how it will work to meet the principles of FAIR data.

Consortium partners may use DMP templates from their home institutions as long as they follow the principles in this plan. We will continually remind partners of these principles, especially during the data collection training (see *D4.1 Monitoring and Evaluation Framework*). Managing data concerning OTTER's results will follow the terms and conditions outlined in the Grant Agreement (GA) and Consortium Agreement (CA). Results will be owned by the partners who developed or contributed to their development. OTTER's results will follow the principles of being FAIR. Appropriate steps will be taken in line with collective and individual institutional policies and procedures to protect IPR prior to publication/release of data.

Data sources used in OTTER will be appropriately referenced, with restrictions on the use of data by third parties identified and adhered to, which will be the responsibility of the relevant project teams. Access to data by third parties prior to formal release will be permitted if consistent with GA and CA. Terms and conditions for release will be specified in a Data Transfer Agreement (DTA), with the agreement of the Ethics and Data Management Committee and teams involved in its creation. The use of data by third parties (e.g., those downloading project data made available for broader use) will require proper acknowledgement of the origins of data, the statement of EU funding and adherence to any restrictions placed on its use.

In line with the Grant Agreement obligations, when OTTER academic partners publish peer-reviewed scientific publications or other types of scientific publications such as conference proceedings and reports, those will be published as open access (green and gold route).

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