

RESEARCH FRAMEWORK FOR IDENTIFICATION OF HISTORICAL CONTENTS THAT CAN RELATE TO STEAM SUBJECTS

WORK PACKAGE 2

Developed by Vytautas Magnus University

1. Purpose and objectives

This framework has been developed within Work Package 2: *STEAM and History in School Curriculum* (hereinafter: WP2), which establishes the methodological foundation for identifying, analysing, and categorising historical content within secondary education curricula that intersects with STEAM disciplines. It provides a structured research approach for detecting and examining historical contents that can be meaningfully linked to STEAM subjects and serves as a common methodological guide for all partners, ensuring consistency, comparability, and rigour in WP2 research activities. Through collaborative design and open access dissemination, WP2 also promotes the sustainability, inclusiveness, and transferability of results across different educational levels and partner countries.

The primary objectives of this framework are:

- ✓ **Developing a structured methodology** to explore historical events, figures, and innovations that have influenced STEAM disciplines.
- ✓ **Establishing criteria** for selecting historical content from school curricula that can be effectively integrated into STEAM education.
- ✓ **Bridging the gap** between humanities and STEM subjects, fostering a holistic understanding of scientific advancements
- ✓ **Providing clear guidelines** for partners to identify both nationally specific and internationally shared PAST contents in curricula

2. Activities and Results

In this work package the activities focus on research and development aimed at identifying, analyzing, and systematizing connections between historical and STEAM contents in secondary school curricula across participating countries. WP2 establishes the methodological and analytical basis for subsequent project phases by defining research procedures, tools, timelines, and roles to be used by all partners during implementation.

The work package begins with Activity A2.1, which develops the common research framework. This methodological activity provides partners with shared guidelines and ensures a unified understanding of the research scope, procedures, and expected outputs before national-level analyses begin. The framework is prepared by the WP leader and validated collaboratively with all partners to guarantee methodological coherence across countries.

Activity A2.2 consists of systematic identification and classification of historical contents related to STEAM subjects in secondary school curricula. Each participating country conducts desk research and prepares a national report analyzing curricula, identifying interdisciplinary links, and highlighting examples of where history and STEAM intersect. These national reports are then consolidated into a comparative synthesis at transnational level.

Activity A2.3 focuses on developing the PAST recommendations framework. Building on the results of the previous activities, partners jointly identify historical–STEAM contents that are common across participating countries and formulate recommendations for integrating them into educational practice. This step transforms research findings into applicable pedagogical guidance for educators and curriculum developers.

Quantitative indicators guiding WP2 implementation include identification and classification of at least **15 examples** of history–STEAM integration in curricula; at least **8 national contents** (two per partner country); at least **7 international shared contents** across all countries.

Qualitative indicators include integration of local expertise through co-creation processes; alignment with European educational standards; development of socially responsive and pedagogically relevant outputs.

Table 1. WP2 activities and results

Activity Title	Timeline	Result
A2.1 PAST Research Framework	01/10/2025 - 31/12/2025	A methodological guide describing research approaches, tools, templates, and timelines for analysing curricula
A2.2 Report on History and STEAM Contents Relations in School Curricula	01/01/2026 - 30/04/2026	A comparative analytical report identifying relevant contents at national, European, and international levels
A2.3 Developing the PAST recommendations framework	01/04/2026 - 30/06/2026	A set of evidence-based recommendations for integrating common historical and STEAM contents across participating countries

3. METHODOLOGICAL APPROACH

3.1 METHODOLOGICAL DESIGN

WP2 applies a structured mixed-methods methodology combining desk research, qualitative curriculum analysis, and expert validation to identify historical contents that relate to STEAM subjects in secondary school curricula. The approach provides a common methodological framework for all partners, ensuring consistency, comparability, and transparency of research procedures across participating countries.

The methodology is designed to produce reliable and transferable results that support cross-national comparison and form a solid evidence base for subsequent project outputs. It enables systematic identification, classification, and analysis of interdisciplinary connections between history and STEAM disciplines while allowing limited contextual adaptation to national education systems.

3.2 DESK RESEARCH AND DATA COLLECTION

The first stage of WP2 consists of structured desk research conducted in each partner country. This phase establishes the empirical foundation for identifying relevant curriculum contents and analysing interdisciplinary links. Partners analyse:

- ✓ national education system structures and regulations;
- ✓ secondary education curricula and subject standards;

- ✓ policy documents and pedagogical guidelines;
- ✓ examples of interdisciplinary teaching practices.

This phase focuses on:

- a) **System analysis** – examining the organisation of secondary education and the role of interdisciplinary learning within national frameworks.
- b) **Curriculum mapping** – identifying themes within history and STEAM subjects that demonstrate conceptual or thematic overlap.
- c) **Practice identification** – collecting existing examples of educational activities illustrating connections between historical and STEAM contents.

Findings are compiled into national research reports, which constitute the primary data source for comparative analysis.

3.3 DATA PROCESSING TECHNIQUES

Following data collection, partners will apply a structured data processing approach to ensure that information gathered from national curricula is organised, standardised, and prepared for comparative analysis. Data processing is conducted using common analytical formats and classification principles agreed within WP2.

Processing includes:

- ✓ structuring collected information according to predefined analytical categories;
- ✓ coding historical contents by thematic domain, historical period, and related STEAM discipline;
- ✓ standardized terminology to ensure consistency across national datasets;
- ✓ verifying completeness and accuracy of recorded entries;
- ✓ preparing datasets for cross-country comparison.

3.4 RESEARCH PROCEDURE

The research process follows a structured sequence of steps applied by all partners:

- ✓ **Definition of learning objectives** - alignment of historical contents with curriculum outcomes and STEAM competences;
- ✓ **Determination of scope** - identification of relevant historical periods, regions, and thematic contexts;
- ✓ **Identification of priority domains** - selection of topics with strong interdisciplinary potential (e.g. technological development, environmental change, scientific discoveries);
- ✓ **Interdisciplinary analysis** - examination of historical topics through STEAM perspectives;
- ✓ **Conceptual mapping** - linking historical contents to modern STEAM concepts and knowledge systems;
- ✓ **Validation** - review of findings by experts and educators.

3.5 EXPERT AND STAKEHOLDER INVOLVEMENT

WP2 implementation involves experts representing complementary fields to ensure both academic validity and practical relevance. Participants include:

- ✓ at least four university experts specialised in curricula and interdisciplinary education;
- ✓ a minimum of twenty secondary school teachers of history and/or STEAM subjects;
- ✓ at least five education specialists;
- ✓ at least five digital research experts;
- ✓ at least ten project partner researchers.

Roles of experts:

- ✓ **Academic experts** validate analytical criteria and findings;
- ✓ **Teachers** confirm curriculum interpretation and pedagogical feasibility;
- ✓ **Education specialists** ensure methodological relevance;
- ✓ **Digital experts** support data analysis and technological aspects.

4 CRITERIA FOR SELECTING HISTORICAL CONTENT FOR STEAM INTEGRATION

To ensure methodological consistency across partner countries and guarantee the relevance of identified materials, WP2 establishes a common set of criteria for selecting historical content from school curricula that can be effectively integrated into STEAM education. These criteria provide a shared analytical standard for evaluating curriculum elements and support the identification of contents that demonstrate meaningful interdisciplinary potential.

The criteria are applied during curriculum analysis and content classification phases and serve as a reference framework for partners when determining which historical topics qualify as PAST contents. Selected historical contents must meet one or more of the following criteria:

- ✓ **Relevance to STEAM disciplines.** The historical topic demonstrates a clear conceptual, thematic, or contextual link with at least one STEAM field.
- ✓ **Curriculum alignment.** The content is included in official secondary school curricula, subject standards, or recognised educational guidelines and is therefore pedagogically applicable within formal education.
- ✓ **Interdisciplinary potential.** The topic enables connections across subject boundaries and can be used to support integrative teaching approaches or interdisciplinary learning scenarios.
- ✓ **Educational value.** The content contributes to the development of key competences such as critical thinking, problem solving, scientific literacy, creativity, or historical reasoning.
- ✓ **Transferability.** The topic has relevance beyond a single national context and may be applicable or adaptable across partner countries.
- ✓ **Authenticity and reliability.** The historical information is supported by credible academic or educational sources and reflects accurate historical interpretation.
- ✓ **Pedagogical feasibility.** The content can realistically be implemented in classroom practice using existing teaching methods, materials, or resources.

During analysis, partners will evaluate each identified curriculum element against the selection criteria and record the results using the common analytical template. Contents that satisfy multiple criteria will be prioritised, as they demonstrate stronger interdisciplinary value and higher potential for integration into STEAM-oriented teaching practices.

5 BRIDGING HUMANITIES AND STEAM DISCIPLINES

This framework promotes integration between humanities and STEAM subjects through the identification of curriculum contents that demonstrate substantive links between historical knowledge and scientific, technological, engineering, historic, and mathematical developments. Such an approach supports a holistic understanding of scientific advancement as a process shaped by cultural, social, and intellectual contexts, while maintaining the integrity of individual disciplines. Rather than merging subject areas, the methodology establishes structured analytical connections that reveal relationships between historical developments and scientific discoveries, technological innovations, environmental change, and societal transformation, thereby enabling the systematic identification of curriculum elements that reflect the reciprocal interaction between historical processes and scientific progress.

The interdisciplinary perspective is operationalized through the methodological procedures of WP2. During curriculum analysis, partners examine historical topics through STEAM lenses in order to determine whether they reflect:

- ✓ the development of scientific ideas and theories;
- ✓ technological or engineering innovations;
- ✓ mathematical reasoning or measurement systems;
- ✓ interactions between society, environment, and technological change.

This analytical approach allows researchers to detect connections that may not be explicitly stated in curricula but are conceptually present and pedagogically exploitable. By systematically identifying such links, WP2 supports the recognition of history as a contextual framework that enhances understanding of STEAM disciplines.

6 GUIDELINE FOR IDENTIFYING NATIONALLY SPECIFIC AND INTERNATIONALLY SHARED PAST CONTENTS

That guideline establishes a common classification approach enabling partners to distinguish between nationally specific and internationally shared PAST contents identified within secondary school curricula. The purpose of these guidelines is not to determine whether a

curriculum element is relevant for STEAM integration—this is addressed through the selection criteria—but rather to define how relevant contents should be categorized once identified.

Within WP2, classification serves an analytical function by supporting comparative interpretation of results across countries and facilitating the identification of themes that demonstrate either contextual specificity or cross-national relevance.

Identified PAST contents are divided into two analytical categories:

Nationally specific contents

These include historical topics, case studies, or examples that are strongly embedded in a particular national curriculum and reflect local historical developments, cultural heritage, national scientific achievements, or country-specific technological or environmental contexts. Such contents are valuable for illustrating how interdisciplinary connections can be rooted in local educational realities.

Internationally shared contents

These include themes or developments that occur across several partner-country curricula. They typically represent historical processes, discoveries, or innovations of global or transnational significance and therefore demonstrate high potential for comparative analysis and transferability across educational systems.

To ensure consistency, partners will distinguish between categories using common analytical principles:

- ✓ geographical scope of the historical phenomenon;
- ✓ recurrence of the topic across national curricula;
- ✓ level of thematic universality;
- ✓ relevance for cross-country comparison.