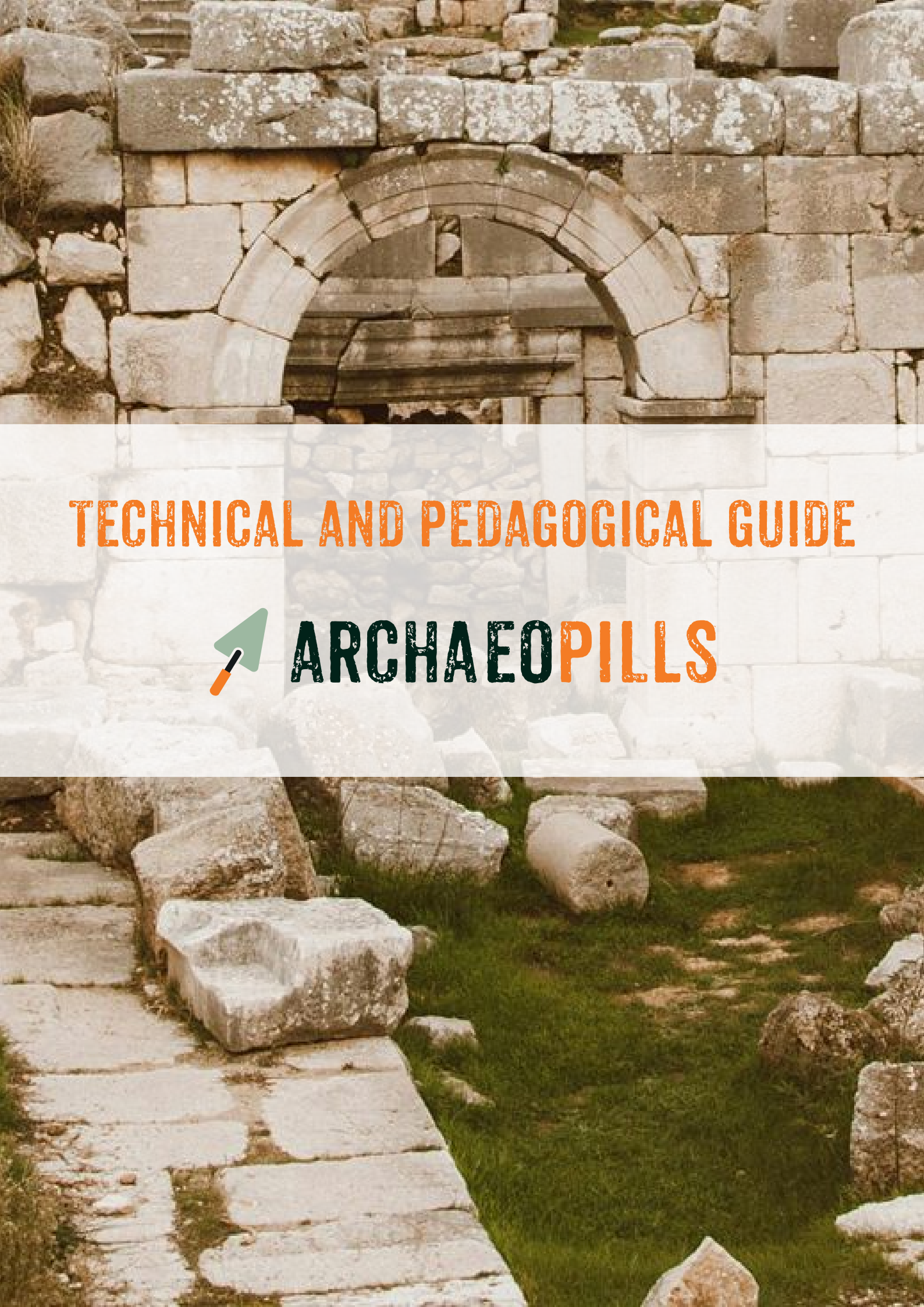




TECHNICAL AND PEDAGOGICAL GUIDE



ARCHAEOPIILLS

TECHNICAL AND PEDAGOGICAL GUIDE

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I - TECHNICAL GUIDE



ARCHAEOPIILLS

PART I. TECHNICAL GUIDE

1. Introduction

1.1. Purpose of the guide

The purpose of this technical guide is to facilitate access, navigation and use of the educational platform **ArchaeoPills** providing teachers, students, researchers and other users with a detailed description of its structure, organization and main functionalities.

ArchaeoPills constitutes the digital environment developed within the framework of the European program **Erasmus+ ArchaeoPills** Designed to support the teaching and learning of archaeology through digital educational resources, multimedia materials, and immersive technologies, the platform integrates an informative web portal and a Moodle-based learning environment, offering unified access to all content developed during the project.

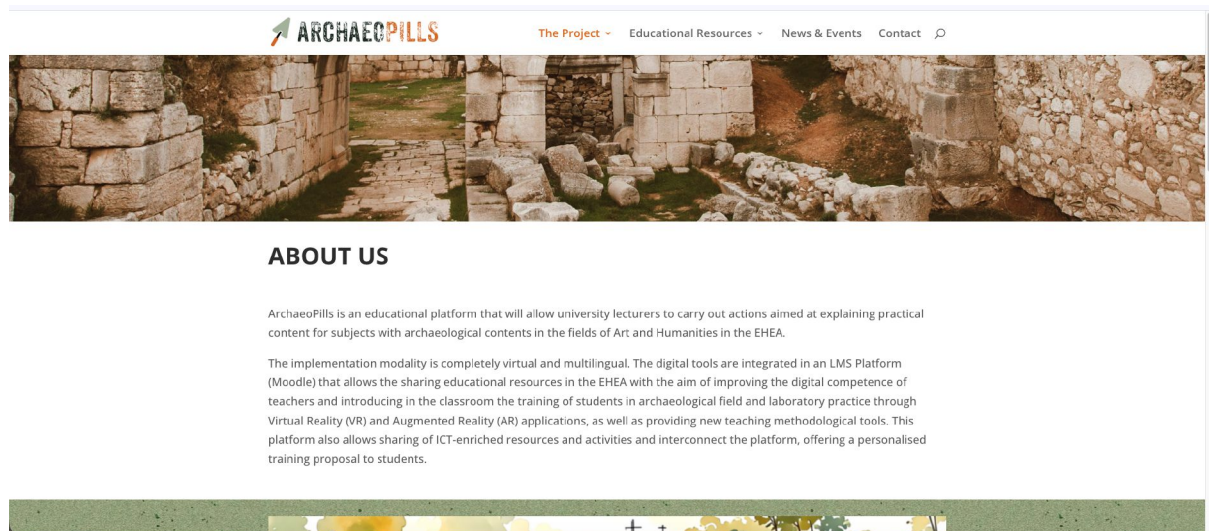
This guide has been prepared as a reference document to facilitate the onboarding of new users to the platform and promote the efficient use of all available resources. Throughout the document, the general operation of the portal, the organization of the learning environment, the structure of the educational materials, and the technical recommendations necessary to ensure a satisfactory user experience are described.

It also includes guidance on the use of the different types of resources available, as well as a compilation of the most common technical issues and their possible solutions.

The main objectives of this guide are the following:

- Facilitate access to the ArchaeoPills platform.
- Explain the general structure of the web portal and the learning environment.
- Describe the organization of the available educational content.
- To guide the user in navigating and locating resources.
- Provide technical recommendations for proper use of the platform.
- To resolve the most frequent doubts and incidents that may arise during its use.

Figure 1. Homepage of the ArchaeoPills platform



1.2. What is ArchaeoPills?

ArchaeoPills is an educational platform developed within the framework of the program **Erasmus+**, whose objective is to improve the practical teaching of archaeology through the integration of innovative digital technologies and open educational resources.

The platform has been designed to support both university faculty and students in disciplines related to archaeology, cultural heritage and the humanities, offering educational materials that complement face-to-face training through active methodologies and digital resources accessible from any device.

The core of ArchaeoPills consists of a Moodle-based learning environment, directly integrated into the project's web portal. This integration allows for easy and centralized access to all educational materials developed during the project without the need to create a user account or log in.

The available resources include training videos, interactive activities, downloadable materials, resources for learning supported by Information and Communication Technologies (ICT) and applications based on Virtual Reality (VR) and Augmented Reality (AR), aimed at recreating different archaeological procedures both in the field and in the laboratory.

Thanks to this approach, ArchaeoPills provides an open, flexible, and multilingual learning environment that promotes self-directed learning, the reuse of educational resources, and the exchange of best practices among higher education institutions.

Figure 2. General environment of the ArchaeoPills platform



1.3. Target audience

The ArchaeoPills platform has been designed to meet the training needs of different user profiles linked to the field of archaeology and cultural heritage, Arts and Humanities.

The platform's main target audience is:

- **University faculty** interested in incorporating innovative digital resources into the teaching of archaeology, archaeological heritage and related disciplines.
- **Higher education students**, especially those taking courses with archaeological content in the Arts and Humanities branch.
- **Researchers**, who wish to consult specialized materials or learn about educational innovation experiences applied to the teaching of archaeology.
- **Higher education institutions**, research centers and other entities interested in integrating open educational resources and digital technologies into their teaching and learning processes.
- **Cultural heritage professionals**, so that they can use the resources as refresher material or supplementary training.

As it is an open access platform, the content can be freely consulted without prior registration, thus promoting a greater dissemination of the knowledge generated during the project and encouraging the transfer of educational resources to the academic and professional community.

2. Web page

2.1. Platform Structure

The platform **ArchaeoPills** It has been designed as an integrated digital environment that combines an informative web portal with a learning management system (**Learning Management System – LMS**) based on **Moodle** This integration allows for unified access

to all project content, facilitating navigation between institutional information and educational resources.

The website serves as the main entry point to the platform. From there, users can access general information about the project, learn about participating institutions, access news and updates, and navigate directly to the learning environment where all educational materials are organized.

The learning environment has been developed on Moodle, one of the most widely used LMS platforms in higher education due to its ability to structure content, organize learning resources, and facilitate self-directed learning. At ArchaeoPills, Moodle is fully integrated into the website, providing users with a seamless and consistent navigation experience between both parts of the platform.

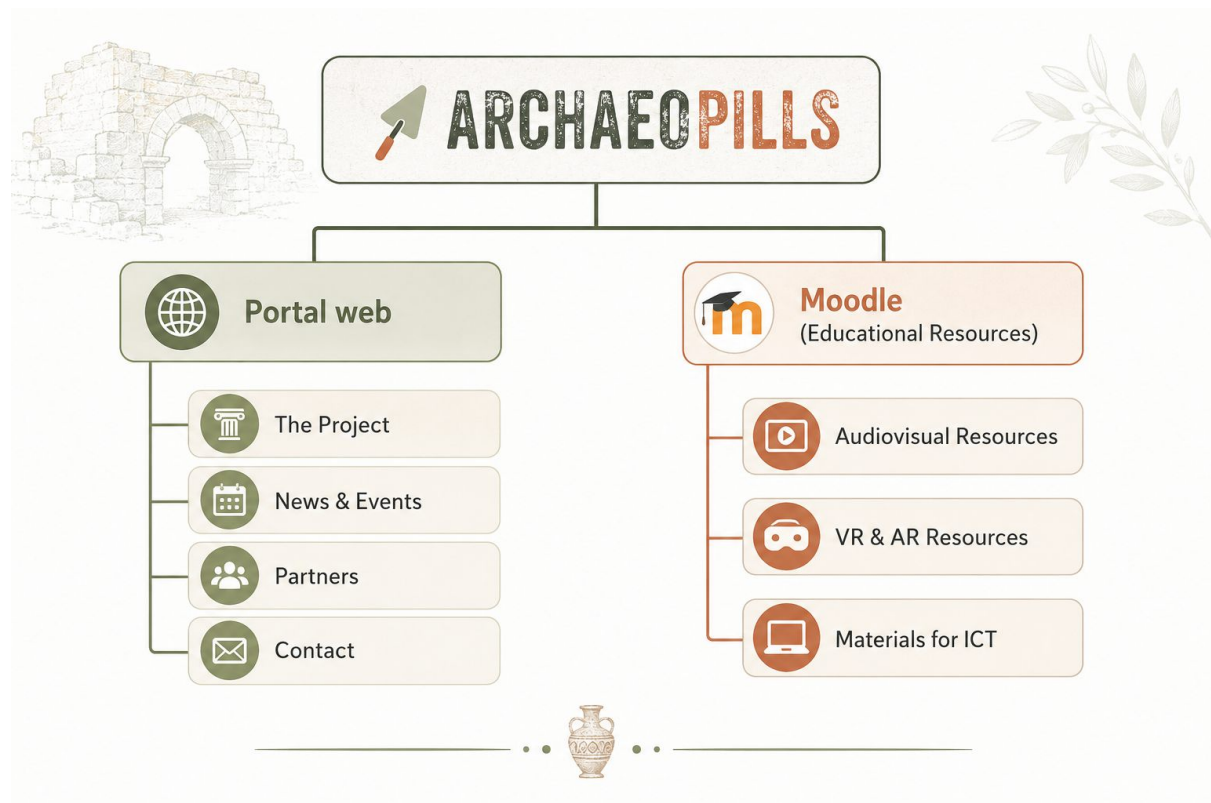
Unlike a conventional virtual campus, ArchaeoPills' learning environment has been configured as a space of **open access**. Therefore, educational resources can be freely consulted without the need to create a user account or log in, thus promoting a wider dissemination of the materials developed during the project and fostering open access to knowledge.

The overall structure of the platform can be summarized in two main functional blocks:

- **Portal web**, intended for the dissemination of the project, the presentation of the consortium, the publication of news and access to institutional documentation.
- **Learning environment (Moodle)**, where all the educational resources developed during the project are housed, organized into different categories according to their nature and educational purpose.

This integrated architecture provides a simple and intuitive browsing experience, reducing the number of steps needed to access content and maintaining a consistent structure from any device.

Figure 3. Overall architecture of the ArchaeoPills platform



What is Moodle?

Moodle (Modular Object-Oriented Dynamic Learning Environment) is a Learning Management System (LMS) used by universities and educational institutions worldwide to organize courses, teaching materials, activities, and learning resources.

At ArchaeoPills, Moodle forms the technological foundation of the learning environment, although it is fully integrated into the project's web portal. Thanks to this integration, users can access all resources from a single platform without needing to authenticate or leave the website.

2.2. Access to the platform

Access to the ArchaeoPills platform is through the project's official website:

<https://www.archaeopills.eu/>

The platform has been designed to offer easy and immediate access to all educational resources. As it is an open access environment, it is not necessary to create a user account or enter login credentials to view the available content.

To ensure proper viewing of all resources, it is recommended to use an updated web browser (Google Chrome, Mozilla Firefox, Microsoft Edge or Safari) and have a stable Internet connection, especially during the playback of audiovisual content or the use of Virtual Reality and Augmented Reality applications.

Once the user accesses the portal, they can navigate through the different sections using the main menu located at the top of the page. From this menu, they can access both the project's institutional information and the learning environment, where all the educational materials are organized.

The usual access procedure is as follows:

- Access the official ArchaeoPills website.
- Locate the main navigation menu.
- Select the section **Educational Resources**.
- Choose the category of resources you wish to consult.
- Access the selected educational resource directly.

Since there is no user authentication, access to the content is immediate and can be done from compatible computers, tablets or mobile devices.

2.3. Portal navigation

The ArchaeoPills website features a simple navigation structure, designed to facilitate access to information and reduce the number of steps needed to locate educational resources.

All main sections are accessible from the top menu, which remains visible while browsing the website. This organization allows users to move between pages quickly and without having to constantly return to the homepage.

The main sections of the portal are as follows:

Section	Description
The Project	It presents the objectives, context and main results of the ArchaeoPills project.

Educational Resources	It provides access to the learning environment implemented on Moodle, where all the educational resources developed during the project are organized.
News & Events	It gathers news, activities and updates related to the development of the project.
Contact	It includes the consortium's contact information and available communication channels.

Navigation between different pages maintains a homogeneous interface, automatically adapting to different screen sizes through a design *responsive*. This allows access to content from computers, tablets, and mobile devices without altering the user experience.

From any page of the portal it is possible to return to the main menu and directly access the learning environment, ensuring smooth navigation between institutional information and training resources.

3. Learning environment

3.1. Course organization

The learning environment of **ArchaeoPills** has been developed using **Moodle**, a learning management system (*Learning Management System, LMS*) widely used in higher education institutions for the organization and distribution of training content.

Within the ArchaeoPills project, Moodle is the platform on which all the educational resources developed by the consortium have been structured. However, with the aim of offering a simpler and more intuitive user experience, the Moodle environment has been **integrated directly into the project's web portal** allowing access to all content from a single platform without the need for authentication.

Unlike traditional virtual campuses, the ArchaeoPills learning environment is presented as an open-access repository of educational resources. Users can freely consult the available materials, play audiovisual content, download technical documentation, and access the applications developed during the project, without needing to create a user account.

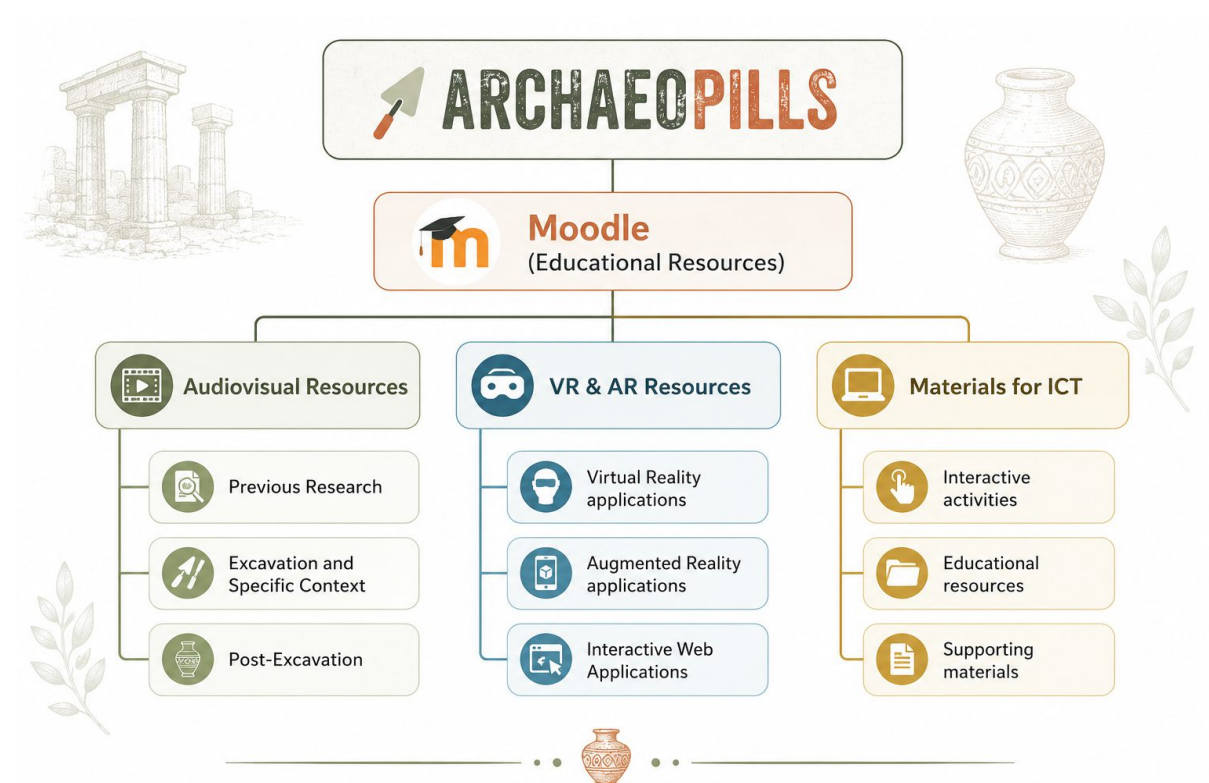
The course is organized hierarchically to facilitate resource location and intuitive navigation. All content is grouped according to its nature and educational purpose into three main sections of learning resources.

The general structure of the learning environment is as follows:

- **Audiovisual Resources**, where the training videos developed during the project are compiled and organized according to the different phases of the archaeological work.
- **VR & AR Resources**, which brings together Virtual Reality (VR), Augmented Reality (AR) applications and other immersive technologies developed to complement hands-on learning.
- **Materials for ICT** which includes digital educational materials, interactive activities and resources designed to support teaching through Information and Communication Technologies (ICT).

This organization makes it easier for teachers, students, and researchers to quickly locate the type of resource they need and access it immediately, while maintaining a homogeneous structure throughout the platform.

Figure 4. Organization of the Moodle environment



3.2. Audiovisual Resources

Audiovisual resources constitute one of the main components of the learning environment of **ArchaeoPills**. Unlike a conventional collection of training videos, the materials developed in the project have been designed as **interactive learning resources**, encouraging active user participation throughout the training process.

Each resource combines theoretical explanations with practical demonstrations conducted in real archaeological contexts. Throughout the presentation, the user encounters different **questions and interactive activities**. These tools allow students to check their understanding of the content before continuing with the video. This approach fosters more dynamic learning, encourages reflection on the concepts presented, and provides ongoing assessment of student progress.

The development of these resources has been carried out using **H5P (HTML5 Package)**. H5P is an open-source tool integrated into Moodle that allows you to create interactive educational content. It incorporates different types of activities, such as multiple-choice or true/false questions, offering a much more engaging learning experience than simply watching a conventional video.

In the case of ArchaeoPills, the resource used has been primarily the **Interactive Video**. H5P has enhanced the training videos with self-assessment questions distributed throughout the playback. These activities allow users to immediately check their understanding of the presented content, reinforcing their learning before continuing to view the material.

In addition to promoting independent learning, this type of resource increases student participation, maintains their attention during playback, and facilitates the consolidation of knowledge through formative assessment integrated into the audiovisual resource itself.

The audiovisual content has been produced by specialists from different institutions participating in the project and covers the main phases of archaeological work, from the research prior to the excavation to the analysis and interpretation of the materials in the laboratory.

To facilitate navigation and maintain a logical learning sequence, the videos are organized into three main thematic blocks:

- **Previous Research**, dedicated to the phases prior to fieldwork, including documentary research, archaeological prospecting and intervention planning.
- **Excavation and Specific Context**, focused on the techniques used during archaeological excavation and the documentation of different intervention contexts.
- **Post-Excavation**, which brings together the procedures developed after the excavation, including the documentation, analysis, conservation, restoration and interpretation of the archaeological materials.

Each audiovisual resource has a dedicated page where users can access the interactive video and view related supplementary information. The videos can be played directly from

the platform without the need to download additional files and allow users to interact with integrated activities during viewing.

Figure 5. Interactive video developed with H5P in the Moodle environment



What is H5P?

H5P (HTML5 Package) is an interactive content creation tool integrated into Moodle that allows the development of dynamic educational materials without the need for programming knowledge.

3.2.1. Previous Research

The block **Previous Research** This resource brings together audiovisual materials dedicated to the preliminary phases of an archaeological intervention. Before any excavation begins, it is essential to develop a research and planning process that allows us to understand the characteristics of the site, gather background information, and select the most appropriate working methodologies.

The resources included in this section present the main techniques used during this initial phase of the archaeological process, addressing aspects related to documentary research,

territory prospecting, spatial analysis and the application of non-invasive technologies for the identification of archaeological structures.

Like the rest of ArchaeoPills' audiovisual resources, all the videos in this section have been developed using **H5P Interactive Video** incorporating self-assessment questions and activities distributed throughout the content. These activities allow users to check their understanding of the material before moving on to the next section, promoting active learning and continuous user participation.

The block **Previous Research** It is composed of the following audiovisual resources:

Audiovisual resource	Main content
Documentary Sources and Archival Techniques in Archaeological Research	Introduction to documentary sources, historical archives and preliminary research techniques applied to archaeology.
Prospection and Spatial Analysis in Archaeological Field Survey	Archaeological prospecting methods and spatial analysis for the identification and planning of interventions on the ground.
Geophysical Prospection Applied to the Detection of Archaeological Structures	Application of geophysical techniques for the detection of archaeological structures using non-invasive methods.
Vertical Archaeology: Strategies for Cataloguing Archaeological Sites Located in Vertical Environments	Procedures for the documentation and cataloging of archaeological sites located in vertical or difficult-to-access environments.

3.2.2. Excavation and specific context

The block **Excavation and Specific Context** This section brings together audiovisual resources dedicated to the archaeological intervention phase in the field and the study of specific contexts that require specialized technical procedures. The videos included here provide insight into the methodologies used during excavation, the documentation of the archaeological record, and the application of various digital techniques employed in fieldwork.

Like the rest of ArchaeoPills' audiovisual resources, all content has been developed as **interactive videos using H5P** incorporating self-assessment questions distributed

throughout the video. These activities allow the user to check their understanding of the concepts presented before continuing with the video, promoting active learning and greater engagement during the training process.

The resources in this section show procedures developed in real archaeological interventions, allowing you to observe step by step the application of scientific methodologies, documentation techniques and digital tools commonly used by professionals in the field of archaeology.

The block **Excavation and Specific Context**It is composed of the following audiovisual resources:

Audiovisual resource	Main content
Archaeological Excavation: Stratigraphic Analysis and Archival Recording Techniques	Excavation strategies, stratigraphic analysis, and archaeological recording techniques during fieldwork.
Field Archaeological Recording: The Use of Photogrammetric Methods in Archaeological Excavation	Application of photogrammetry techniques for the accurate documentation of archaeological excavations.
Aerial Photogrammetry and 3D Modelling in Archaeological Documentation	Use of aerial photogrammetry and three-dimensional modeling for the documentation of archaeological heritage.
Archaeology of Built Heritage 1. Field Data Collection	Data collection procedures in interventions on built heritage.
Funerary Archaeology: Micro-Excavation of Cremation Urns in the Laboratory	Methodology for micro-excavation of cinerary urns in a laboratory context.

3.2.3. Post-Excavation

The block **Post-Excavation** brings together the audiovisual resources dedicated to the activities carried out after the completion of fieldwork. Once the archaeological excavation is finished, an essential phase of the scientific process begins in which the recovered materials are documented, analyzed, preserved, restored, and interpreted before their study and dissemination.

The resources included in this section present different laboratory procedures and specialized techniques used in the management of archaeological heritage. Through practical examples, users will learn about the processes of digital documentation, materials analysis, preventive conservation, restoration, archaeological illustration, and the study of different types of evidence recovered during excavation.

As with the rest of ArchaeoPills' audiovisual resources, all videos have been developed using **H5P Interactive Video**, incorporating interactive questions distributed during playback that encourage active user participation and allow checking understanding of the content before continuing with learning.

The block **Post-Excavation** is composed of the following audiovisual resources:

Audiovisual resource	Main content
Digital Documentation of the Excavation Process: Desk-Based Phase	Digital documentation processes and treatment of archaeological information after excavation.
Archaeology of Built Heritage 2. Data Analysis	Analysis and interpretation of the data obtained during the study of the built heritage.
Preventive Conservation and Restoration of Archaeological Materials	Principles of preventive conservation and restoration applied to archaeological materials.
Conservation and Restoration Treatments for Roman Mural Paintings	Specific techniques for the conservation and restoration of Roman mural paintings.

Drawing Archaeological Material Step by Step: From Manual to Digital Graphic Recording	Archaeological drawing procedures from manual recording to digital documentation.
Step-by-Step Guide to Drawing Archaeological Materials	Graphic elaboration of archaeological materials using different representation techniques.
From the Site to the Laboratory: How Archaeozoology Works	Introduction to archaeozoological work and analysis of faunal remains recovered in excavation.
Completing the Epigraphic Record: A Practical Guide	Documentation, analysis and interpretation of archaeological inscriptions.
Cleaning and Classification of Finds / Organization of a Warehouse	Processes of cleaning, classifying, inventorying and organizing archaeological materials in the laboratory and warehouse.

3.3. VR and AR Resources

The section **VR & AR Resources** brings together the immersive applications developed within the framework of the ArchaeoPills project to complement practical training in archaeology through the use of technologies **Realidad Virtual (Virtual Reality, VR)**, **Augmented Reality (AR)** and **web-based interactive environments**.

These resources allow users to practice different archaeological procedures in a safe virtual environment, fostering the acquisition of technical skills before their application in real-world contexts. The applications have been designed to complement the course's audiovisual resources, transferring some of the procedures presented in the training videos to an immersive environment.

All the applications available in this section are focused on training for the **micro-excavation of cinerary urns in the laboratory** allowing the user to experience different interaction modes adapted to different devices and levels of immersion.

Each application has a specific page within the Moodle environment that includes all the resources necessary for its use. Depending on the type of application, the user will find:

- Application overview.
- Installation and user manual.
- Downloadable files.
- Demonstration video.
- Associated scientific publication.
- Recommended bibliographic reference.
- License and terms of use.
- Legal notice (*Disclaimer*).

AVAILABLE APPLICATIONS:

The ArchaeoPills platform incorporates three immersive applications that offer different levels of interaction and are adapted to different technological devices.

Application	Technology	Device
Virtual Reality Application for Funerary Urn Micro-excavation	Virtual Reality	Meta Quest
Augmented Reality Application for Funerary Urn Micro-excavation	Augmented Reality	Android devices
Interactive Web-Based Virtual Reality Application	Interactive web application	Web browser

Usage licenses:

All applications and materials available in this section are distributed under the license **Creative Commons Attribution–NonCommercial–NoDerivatives 4.0 International (CC BY-NC-ND 4.0)** unless expressly stated otherwise.

3.4. ICT Materials

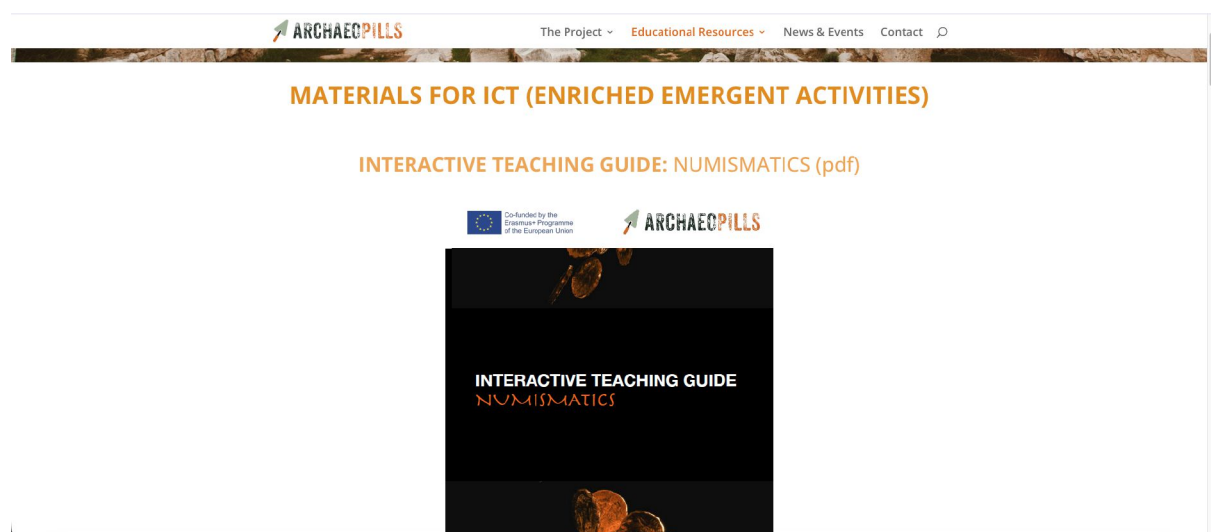
The section **Materials for ICT (Enriched Emergent Activities)** brings together the educational materials developed by the ArchaeoPills project to facilitate the incorporation of archaeological content into teaching contexts through the use of Information and Communication Technologies (ICT).

Unlike audiovisual resources and Virtual Reality and Augmented Reality applications, this section offers structured teaching materials primarily intended for teachers, providing methodological proposals that can be directly integrated into classroom activities.

In the current version of the platform, this section includes a **Interactive Educational Guide on Numismatics**, designed as an educational resource to support the teaching of archaeological heritage and promote active learning through contextualized activities.

The material is available in PDF format and can be viewed or downloaded directly from the platform.

Figure 6. Interactive guide



The **Interactive Teaching Guide: Numismatics** is a teaching resource developed within the framework of the ArchaeoPills project with the aim of bringing students closer to the study of numismatics from a practical and participatory perspective.

The guide proposes a sequence of activities focused on the value of coins as a source of historical and archaeological information, allowing us to understand how these materials contribute to the knowledge of past societies.

Its methodological approach favors observation, analysis, interpretation of evidence and the development of critical thinking, incorporating proposals that can be implemented both in the classroom and in other educational contexts.

The resource is specifically geared towards students of **Primary Education and the first years of Secondary Education**, although it can be adapted to other educational levels depending on the teaching objectives.

The guide is presented in PDF format and is available for viewing and download from the platform.

Access to the resource:

To access the teaching guide, the user only needs to:

1. Access the section **Educational Resources** del portal ArchaeoPills.
2. Select the section **Materials for ICT (Enriched Emergent Activities)**.
3. Click on **Interactive Teaching Guide: Numismatics (PDF)**.
4. View the document directly from your browser or download it for offline viewing.

No login or specific permissions are required to access the resource, as it is part of the open access educational materials developed by the project.

4. Types of resources

The platform **ArchaeoPills** integrates different types of educational resources, designed to meet various learning objectives and provide a comprehensive learning experience. All resources are organized within the Moodle environment and can be accessed directly from the project's website.

Each type of resource has specific characteristics and offers different ways to interact with the user, combining audiovisual materials, immersive applications, educational documents, and downloadable resources.

The following table summarizes the main types of resources available on the platform.

Resource type	Description	Format
Interactive videos	Audiovisual resources enriched with self-assessment questions developed using H5P.	Online playback
VR Applications	Virtual Reality applications for Meta Quest devices that allow the practice of archaeological procedures in immersive environments.	Downloadable application
AR Applications	Augmented Reality applications for compatible Android devices.	Downloadable application
Interactive Web Application	Simulation accessible from the browser without the need for installation.	Web application
Teaching guides	Educational materials intended for teachers and students to complement learning.	PDF document

5. Frequently Asked Questions

Do I need to create an account to access the platform?

No. The ArchaeoPills platform offers open access to all its educational resources. Registration and a username and password are not required to view the available content.

Is it necessary to install Moodle to access the course?

No. The learning environment was developed on Moodle, but it is fully integrated into the ArchaeoPills web portal. Access is directly from the project website using a web browser, without the need to install any additional software.

Can I access the platform from any device?

Yes. The platform can be accessed from compatible computers, tablets, and mobile devices. However, some Virtual Reality (VR) and Augmented Reality (AR) applications require specific devices to function correctly.

The videos are not playing correctly

Possible causes

- Unstable internet connection.
- Outdated browser.
- Temporary problems loading content.

Solution

- Refresh the browser page.
- Check your internet connection.
- Use a compatible and up-to-date browser.
- Wait a few seconds until the resource has finished loading.

Interactive questions do not appear during the video

The interactive videos have been developed using **H5P**. Therefore, it is necessary that the browser allows the execution of interactive content.

Solution

- Update your browser to the latest available version.
- Reload the page.
- Verify that JavaScript is enabled.
- Avoid using outdated browsers.

I cannot download a Virtual Reality or Augmented Reality application

Possible causes

- The device is not compatible.
- The download has been interrupted.
- The browser has blocked the file.

Solution

- Verify that the device meets the technical requirements.
- Repeat the download.
- Consult the installation manual available on the platform.

The Virtual Reality application is not working properly

Before running the application, check that:

- The Meta Quest device is compatible.
- There is sufficient storage space.
- The operating system is up to date.
- The installation was carried out following the instructions in the user manual.

If the problem persists, it is recommended to reinstall the application.

I cannot open a PDF document

Possible causes

- There is no PDF viewer installed.
- The file has not been fully downloaded.

Solution

- Download the document again.
- Open the file with a compatible PDF viewer.
- Update the document reader installed on the device.

The platform takes a long time to load

Loading time may increase when:

- The internet connection is slow.
- There are several applications using the network simultaneously.
- Large files are being downloaded.

It is recommended to close other applications that consume bandwidth and reload the page.

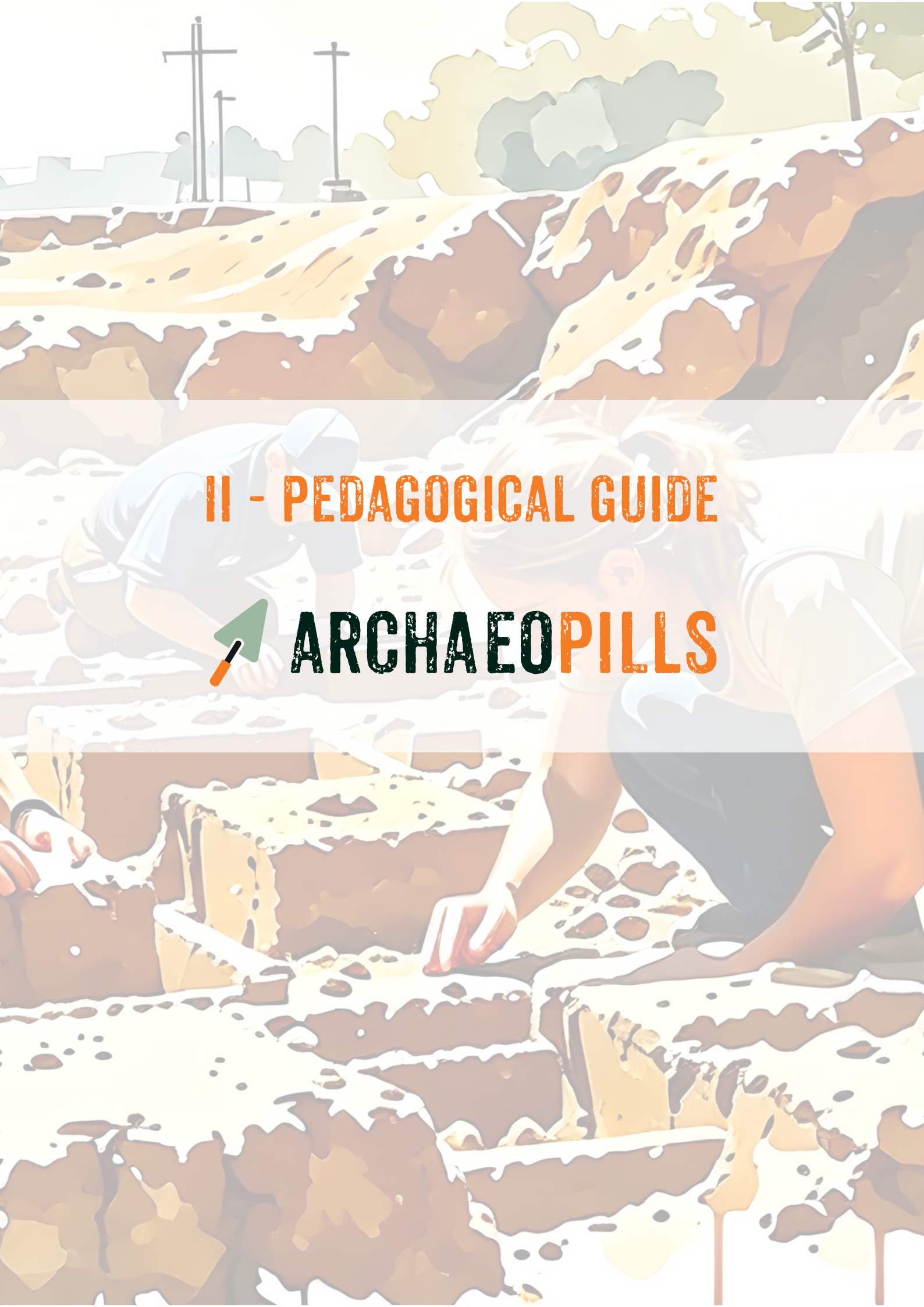
Can I use the resources for teaching purposes?

Yes. Educational resources developed on ArchaeoPills can be used in accordance with the terms of the license indicated for each resource. It is recommended to consult the licensing information available on the platform before reusing or distributing any material.

Where can I get more information about a resource?

Each resource has a specific page where the user can consult additional information, such as the resource description, learning objectives, user manuals, demonstration videos, associated scientific publications, technical documentation and information about the license for use.

By following these recommendations, it will be possible to resolve most common technical issues and ensure proper access to all educational resources available on the platform.



II - PEDAGOGICAL GUIDE



ARCHAEOPIILLS

PART II. TEACHING GUIDE

1. Presentation and purpose of the course

The course **ARCHAEOPILLS. Face to face with practical archaeological training in higher education** This project is part of a European Erasmus+ project aimed at strengthening practical training in archaeology within higher education. The project is funded by the European Union under the Erasmus+ program, with the code **2023-1-FR01-KA220-HED-000164770**.

ARCHAEOPILLS was created to offer digital training resources that facilitate the learning of archaeological content from a practical, visual, and interactive perspective. To this end, the course is delivered in a virtual learning environment, specifically on the Moodle platform, and is primarily structured around videos, interactive H5P videos, and virtual reality (VR) and augmented reality (AR) resources.

From a pedagogical perspective, the course is a structured training program that allows students to become familiar with the main phases of archaeological work. The course's organization makes it easy for the content to be used both independently and within a course or teaching program guided by instructors.

The use of virtual platforms such as Moodle can integrate content, activities, assessment, and monitoring within a single space. Virtual learning environments promote the organization of the educational process, interaction, flexibility, and monitoring of student progress, provided they are designed from a pedagogical perspective (Al-Hamad, 2022; Gamage et al., 2022; Konstantinidou & Nisiforou, 2022).

The main objective of the course is to facilitate the progressive learning of archaeology through audiovisual and immersive resources that allow understanding of procedures, observing situations linked to archaeological practice and checking understanding through interaction integrated into certain videos.

2. Pedagogical rationale

The ARCHAEOPIILLS course is flexible and designed for higher education learning. Students don't simply receive information; they participate in a progressive process of understanding, analyzing, and interpreting archaeological content through videos, interactive videos, and digital experiences using virtual and augmented reality.

Each type of resource serves a specific pedagogical purpose: videos present and contextualize procedures and content; interactive H5P videos incorporate questions during viewing and promote checking comprehension; and virtual and augmented reality resources expand the observation and exploration of archaeological contexts, objects or situations from an immersive perspective (Biggs, 2014).

ARCHAEOPIILLS It proposes a structured training itinerary. The organization of the course allows students to progress from the acquisition of basic concepts to the interpretation of evidence, the use of digital tools, and reflection on the processes inherent to archaeological work, since archaeology is a discipline that combines theoretical knowledge, technical procedures, analysis of materials, contextual interpretation, and decision-making (Croucher et al., 2008; Handley, 2015).

Archaeological training in higher education requires approaches that connect students to the logic of professional practice. Although the course takes place in a virtual environment, its design seeks to maintain a connection with situations typical of archaeological work, such as the observation of material remains, documentation, interpretation of sources, comparison of hypotheses, and communication of results. In this way, digital learning becomes a process of understanding real-world situations.

The course incorporates a multimodal learning perspective by combining videos, interactive H5P videos, and virtual reality (VR) and augmented reality (AR) resources. This variety of formats allows information to be presented in different ways and introduces students to archaeological content and procedures through audiovisual representation, interaction, and immersive exploration. In virtual learning environments, a clear structure, interactivity, accessibility of resources, and the presence of instructor support are relevant factors for fostering a quality learning experience (Konstantinidou & Nisiforou, 2022).

The use of Moodle allows for the integration of resources, activities, monitoring, and assessment in a single space. Furthermore, it promotes participation, learning organization, online assessment, and tracking of student progress (Al-Hamad, 2022; Gamage et al., 2022). ArchaeoPills is not only based on the **use of technology** but rather it focuses on how technology is integrated with the objectives, activities and support.

Table 1. Pedagogical principles of the ArchaeoPills course

Pedagogical principle	Application in the course
Active learning	Students analyze, interpret, respond, compare, reflect, and apply content.
Multimodal learning	The course combines videos, interactive H5P videos, and virtual and augmented reality resources.
Flexibility	It can be used independently or with guidance, adapting to different rhythms and contexts.
Practical guidance	The contents are linked to phases, procedures and problems specific to archaeology.
Use of technology	Digital resources are used as a means to visualize, explore, and understand archaeological content.

3. Target audience and application context

The course is primarily aimed at **higher education students**. This course is for anyone who wants to acquire, reinforce, or contextualize knowledge related to archaeology and its working methods. It can be used in degrees related to archaeology, history, heritage, or humanities.

The resources are suitable for students who are approaching archaeological methods for the first time, as well as for those who want to consolidate content related to planning an intervention, fieldwork, recording evidence, interpreting materials, or the subsequent phase of analysis and communication of results.

Also, for the **university faculty** who want to incorporate digital resources into their teaching, reinforce practical content, or propose autonomous learning activities. **ARCHAEOPILLS** It does not replace face-to-face teaching or fieldwork, but rather they can be complementary. The online learning platform can enrich the learning experience when integrated into a clear teaching plan and combined with meaningful activities and well-organized resources (Gamage et al., 2022; Konstantinidou & Nisiforou, 2022).

The course can be applied in **blended learning contexts** This format allows students to review materials before or after in-person sessions. It enables class time to be used for resolving doubts, discussing, analyzing, and carrying out practical activities or delving deeper into complex content. Furthermore, it can be used as a reinforcement resource in practical subjects, seminars, or workshops.

4. Usage modalities

ARCHAEOPILLS It is designed to be used flexibly, depending on the learning context, the students' level of autonomy, and the teachers' level of involvement. This allows it to be integrated into both self-directed learning processes and guided training activities within a course, seminar, or practical exercise.

According to the course structure, two main modes of use are contemplated: self-directed and self-assessment mode and teacher-guided mode (Table 2). Both modes share the same basic materials, but differ in the degree of support, interaction, monitoring and pedagogical depth.

The self-directed and self-assessment approach allows students to progress through the content independently. In this case, videos, interactive H5P videos, and virtual and augmented reality resources function as a flexible learning path. Interactive videos allow students to check their understanding through integrated questions and feedback, while VR/AR resources encourage visual and immersive exploration. This approach makes it easy for students to organize their own pace and review resources as needed.

The **teacher-led mode** It incorporates greater teacher involvement. Teachers can contextualize the content, select the most appropriate resources, ask questions, propose extension activities, facilitate forums, answer questions, and offer feedback. This approach allows the course to be integrated into a broader teaching plan and fosters more guided and reflective learning.

Table 2. Course modalities

Aspect	Self-taught and self-assessed modality	Teacher-led modality
Purpose	To enable students to learn independently using the available materials.	Integrate the course into a teaching proposal accompanied by interaction and feedback.

Role of the students	Watch videos, respond to H5P interactions, and explore VR/AR resources at your own pace.	Use the resources as a basis for activities, questions, debates, or tasks proposed by the teachers.
Role of the teaching staff	It facilitates access to the course and can offer general usage guidelines	It accompanies the process, contextualizes content, answers questions, energizes activities, and provides feedback.
Resource type	Videos, H5P interactive videos, and virtual and augmented reality resources.	The same resources, contextualized or complemented with teaching proposals.
Monitoring of learning	Checking comprehension through interactions integrated into H5P.	Teacher monitoring and feedback, when integrated into a subject or training activity.
Contexts	Self-employment, reinforcement or supplementary training.	University subjects, seminars, workshops, internships, flipped classroom or continuous assessment.

In virtual learning environments, the quality of the learning experience depends largely on the clarity of the structure, the coherence between activities and objectives, the accessibility of resources, and the support offered to students (Konstantinidou & Nisiforou, 2022). Moodle allows for the organization of content, activities, assessment, and monitoring within the same space, which facilitates both autonomous learning and teacher support (Al-Hamad, 2022; Gamage et al., 2022).

5. Learning Objectives

The course learning objectives are linked to the progressive understanding of the archaeological process, the analysis of materials and evidence, the use of digital resources, and the development of an active approach to learning. It aims to foster interpretation, critical reflection, and the application of knowledge to situations related to archaeological practice (Croucher et al., 2008; Handley, 2015). The objectives are:

- To introduce basic concepts of archaeology by familiarizing students with the terminology, procedures and main phases of archaeological work.
- Understanding the main phases of the archaeological process, from pre-intervention preparation to fieldwork, recording, analysis, interpretation and post-excavation.
- Promote critical thinking through analysis, sources, evidence, contexts, and interpretive hypotheses.
- Promote the use of digital resources applied to learning archaeology, including the Moodle platform, videos, H5P interactive videos, and virtual and augmented reality resources.
- Develop learning autonomy through flexible access to resources, the ability to review videos at one's own pace, and feedback integrated into H5P interactive videos.
- Encourage active participation and collaborative work, especially in the guided modality, through debates, forums, extension activities, case analysis or group tasks.
- Improve the ability to interpret archaeological and historical sources, relating material remains, contexts, data and hypotheses to build well-founded explanations.

6. Skills

The course **ArchaeoPills** It takes as its reference point the European approach to lifelong learning, in which competences are understood as a combination of knowledge, skills, and attitudes necessary for personal development, social inclusion, active citizenship, and employability. The European Union identifies eight key competences for lifelong learning, set out in the 2018 Council Recommendation.

6.1. Key Competencies

Key Competences, within the framework of the European Union, consist of lifelong learning, and offer a common reference for developing cross-cutting proposals, autonomy to learn, citizenship or cultural awareness.

Table 3. Key Competencies

Key Competencies	ArchaeoPills
Literacy skills	It is developed through the reading, understanding and interpretation of archaeological content, historical sources, supplementary materials and analysis activities.
Mathematical, scientific, technological and engineering competence	It is approached in an applied manner by working on procedures of observation, recording, analysis, documentation and use of technologies linked to the archaeological study.
Digital competence	Work is done through the use of Moodle, H5P interactive videos and virtual and augmented reality resources applied to learning archaeology.
Personal, social and learning-to-learn competence	It is fostered through autonomy to access, review and interact with digital resources at one's own pace.
Civic competence	It is linked to the understanding of archaeological heritage as a cultural asset, as well as to reflection on its conservation, interpretation and social communication.
Entrepreneurial competence	It develops when students analyze problems, make decisions, formulate hypotheses, solve tasks, and apply knowledge to practical situations.
Competence in cultural awareness and expression	It is present in the interpretation of material remains, historical contexts, and cultural manifestations of the past.

6.2. Digital competence and DigComp 3.0

Specifically, digital competence is addressed by taking as a reference **DigComp 3.0: European Digital Competence Framework** (Cosgrove & Cachia, 2025). This framework describes the knowledge, skills, and attitudes necessary to use digital technologies critically, safely, and responsibly in learning, work, and social contexts. DigComp 3.0 updates the framework based on recent technological changes and incorporates a more cross-cutting focus on artificial intelligence and new digital challenges.

Table 4. *Application of DigComp 3.0 areas*

DigComp Area 3.0	Application in the course
Information and data literacy	Consultation and interpretation of archaeological information presented through audiovisual, interactive and immersive resources.
Communication and collaboration	In the guided mode, the resources can serve as a basis for discussion, the exchange of interpretations, and collaborative work proposed by the teaching staff.
Digital content creation	Interaction with digital content and understanding of different forms of audiovisual and immersive representation applied to archaeology.
Security	Responsible use of platforms, digital sources, images, data and online resources, taking into account criteria of reliability, authorship, privacy, digital well-being and ethical use of information.
Problem solving	Proper use of Moodle, H5P and VR/AR resources, including troubleshooting basic technical difficulties and selecting the most appropriate resource for each learning purpose.

7. General course structure

The ARCHAEOPIILLS course is organized on Moodle using three main types of learning resources: videos, interactive H5P videos, and virtual reality (VR) and augmented reality (AR) resources. This structure reflects the final course design and allows for a combination of audiovisual explanations, interactive learning, and immersive exploration of archaeology-related content.

Table 5. *General course structure*

Resource type	Function within the course
Videos	They present content, procedures, and demonstrations related to archaeological practice.
H5P Interactive Videos	They integrate questions during viewing to promote attention, understanding, and self-evaluation.
VR/AR Resources	They allow you to explore spaces, objects, contexts or representations related to archaeology in a visual and immersive way.

The resources are presented within the Moodle environment in an organized way to facilitate navigation and independent access. Not all content requires the same form of interaction: some videos have a primarily expository and demonstrative function; the H5P videos incorporate integrated questions; and the VR/AR resources allow for a visual and immersive approach to archaeological elements, spaces, or procedures.

Table 6. *Internal structure of each block*

Resource	Pedagogical guidance
Video	Observation, explanation and demonstration of content and procedures.
Interactive video	Active visualization with integrated questions and feedback via H5P.
Virtual reality (VR)	Immersive exploration of environments, reconstructions or archaeological contexts.
Augmented Reality (AR)	Overlay and contextualized visualization of information or digital elements.

From a pedagogical perspective, the combination of videos, interactive videos, and VR/AR resources promotes multimodal learning. Video facilitates the observation of procedures and visual explanation; H5P interactivity introduces moments of comprehension checks during viewing; and immersive technologies allow for the exploration and representation of archaeological content in a way that is difficult to reproduce solely through text or static images (Poquet et al., 2018; Garstki et al., 2019; Banfi, 2020).

8. Methodology

The ARCHAEOPIILLS course methodology is based on a flexible, multimodal, and practice-oriented approach. Students access explanations and demonstrations via video, interact with questions integrated into the H5P videos, and explore virtual and

augmented reality resources. The combination of these formats aims to link learning objectives with digital resources appropriate for understanding archaeological procedures and contexts (Biggs, 2014).

Furthermore, in the guided format, the course can incorporate strategies for **Problem-Based Learning (PBL)**. To this end, teachers can pose questions, cases, or situations related to archaeological practice, such as the interpretation of a find, the planning of an excavation, the analysis of materials, or the conservation of heritage. This approach is relevant in the teaching of archaeology, as it fosters the connection between theory, practice, analysis of evidence, and decision-making (Croucher et al., 2008; Handley, 2015).

9. Implementation Guidelines

The following guidelines are recommended:

- Define in advance the course usage modality, indicating whether students will work independently, whether there will be teacher support, or whether both options will be combined.
- Explain to the students the three main types of course resources —videos, H5P interactive videos and VR/AR resources— and the function of each one within the learning process.
- Relate each block to the learning objectives, so that the resources are not perceived as isolated materials, but as part of a coherent learning sequence (Biggs, 2014).
- Use videos as a resource for explanation, demonstration, and observation, making it easy for students to stop, review, or re-view the content when necessary.
- Take advantage of H5P interactive videos as a self-assessment and comprehension check resource, allowing students to answer integrated questions and review content when necessary.
- Integrate virtual and augmented reality resources as a complement to the visual and immersive exploration of contexts, objects, spaces or procedures related to archaeology.
- In the guided modality, supplement the course resources with questions, case analyses, debates or practical activities proposed by the teaching staff when relevant to the subject or teaching context.
- Provide feedback and contextualization when the course is used in a guided manner, especially based on responses to interactive videos and discussions of audiovisual and immersive resources.
- Periodically check the functionality of videos, H5P content, and VR/AR resources to ensure their availability and proper display.

- Adapt the pace of work to the teaching context, especially if the course is integrated into a subject, seminar, workshop, practice or blended learning proposal.

Overall, the course implementation must maintain a clear pedagogical purpose: to help students understand the archaeological process through audiovisual, interactive, and immersive resources. Moodle acts as the environment that organizes and provides access to these materials, preventing them from being perceived as isolated resources (Gamage et al., 2022; Konstantinidou & Nisiforou, 2022).

9.1. Perspective of teaching action

There are two main ways to participate in the course:

- 1. Content facilitation:** The teacher simply provides access to the materials for students to explore at their own pace.
- 2. Active participation:** The teacher guides the activities, encourages interaction, and provides feedback.

In the autonomous mode, it is recommended that students follow the organization proposed in Moodle, view the videos, complete the H5P interactions, and explore the available VR/AR resources.

- **Dynamization:** In guided contexts, teachers can use videos and immersive resources as a starting point for questions, discussion, or collective analysis.
- **Follow-up:** When the teaching context allows, the teaching staff can check participation and resolve doubts related to the content and the use of digital resources.
- **Feedback:** The questions integrated into the H5P videos offer feedback during viewing; in the guided mode, this can be complemented with comments and explanations from the teaching staff.

The combination of self-directed learning and teacher support allows the same resources to be used with different levels of guidance. The interaction built into H5P and exploration via VR/AR reinforce the active role of students without requiring the course to depend on forums, assignments, or additional activities within Moodle.

The teacher is advised to consider:

- Problem-Based Learning (PBL) to stimulate critical thinking and problem-solving skills in students, fostering a deeper understanding of the subject.
- Social interaction to promote collaborative learning, where students can share ideas, participate in debates and support each other in their learning process.

This approach ensures that students are not merely passive recipients of information, but also active participants in their educational experience, developing essential skills for academic and professional success.

10. Conclusions

In conclusion, this course is designed to offer an online learning experience based on audiovisual, interactive, and immersive resources. Videos allow for the presentation and demonstration of archaeological content; interactive H5P videos incorporate comprehension checks; and virtual and augmented reality resources expand the possibilities for observing and exploring contexts related to archaeology.

The integration of these resources into Moodle allows for flexible use, both independently and with teacher support. The course's pedagogical value lies in the combination of formats and their connection to content and procedures specific to archaeological practice, fostering a visual, interactive, and applied approach to learning.

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