



SciArt Case Study

Piloting and Implementation of the
SciArt activities in Thessaloniki,
Greece



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Piloting of the SciArt activities in Thessaloniki, Greece

Location of the Implementation

The implementation of the SciArt process was carried out at the Experimental School of the University of Thessaloniki, Thessaloniki, Central Macedonia, Greece, with the appropriate permission from the Aristotle University of Thessaloniki, and the consent of the parents of the students.

School Profile

The Pilot Implementation of the SciArt process was carried out in the Experimental School of the University of Thessaloniki. The Experimental School of the University of Thessaloniki is a public educational institution that provides continuous education from kindergarten through to upper secondary school (Lyceum). Admission is determined through a lottery system, ensuring equal access for all applicants. The school operates under the supervision of the Aristotle University of Thessaloniki and serves as a hub for educational innovation. It actively implements innovative teaching practices and interventions, closely linked to contemporary research in education and educational science. This collaboration with the academic community fosters a dynamic learning environment and supports the development of evidence-based educational methodologies.

Teaching Staff Involved

Six permanent teachers from the school, each representing a different subject area, participated in the pilot implementation. Specifically, the group included three Greek language teachers, one science teacher, one mathematics teacher, and one informatics teacher. All participating educators have over ten years of teaching experience and hold advanced qualifications in their respective fields. Each of them holds a postgraduate degree, and several also possess a doctoral degree relevant to their discipline. Their names are, respectively: Alexandra Mylona, Maria Paliachani, and Despina Taketzidou (Greek language teachers), Sapfo Fotiadou (science teacher), Loukia Petrotsatou (Mathematics teacher), and Filippos Koutsakas (Informatics teacher).

Student Participation

The participating students were all 26 members of a second-grade lower secondary class (Grade 8), approximately 14 years old. The group reflected a balanced distribution in terms of gender and residential area. The implementation took place during regular school hours, integrated into the curriculum through the subjects of History, Physics, and Computer Science.

Artifact(s) Under Investigation

List of the artifacts used in the implementation of the pilot:

- Paintings “Those left behind” and “Women’s Bazaar”, A. G. Leventis Gallery, Cyprus
- Clay Lamp and Icon of the Virgin Mary, Byzantine Museum, Greece
- St. Christopher Alm Dish and Stern Knee Timber, Esposende Museum, Portugal

Classroom Activities and Examples of the Case Study

The teaching approaches developed for the project utilized educational material specifically designed within its framework. This included inclusive, inquiry-based worksheets that incorporated augmented reality to introduce students to archaeometric methods. Through these tools, students were engaged in the analysis and interpretation of data related to specific artifacts.

The activities adopted an inquiry-based learning model. The cycle of inquiry included five phases: (a) Orientation, (b) Conceptualization, (c) Investigation, (d) Conclusion, and (e) Discussion. Students participated in inquiry-based activities aimed at raising awareness of cultural heritage, fostering critical thinking through the interpretation of archaeometric data, and encouraging creativity through historical and cultural storytelling centered around the artifacts. Activities were designed to promote group work and classroom dialogue, enhancing students' collaboration and communication skills.

Example (Artifact: Clay Lamp)

Teachers used guiding questions to promote curiosity and engage students, such as “Can we analyze the components of this clay lamp from the late 4th century AD? Can we compare it with contemporary clay objects?” and “Can we hypothesize how such clay products were used in daily life?”. Students focused on the problem, posed questions, and formed hypotheses, such as “How can we closely examine the lamp’s features?” or “What tools or devices might help us extract detailed information from the artifact?”. Students were familiarized with the 5 archaeometric methods through the Augmented Laboratory Instrument “ALI” and explored characteristics of instruments that could yield interpretable data about the clay lamp. Students interpreted their findings and tried to draw broader insights. From their analysis, they identified aspects of the materiality and ageing of the clay lamp. At the end of the process, through the analysis of archaeometric data, students discovered the presence of a foreign substance at the base of the clay lamp, which was identified as oil. At the same time, the materials used in the construction of the lamp itself were identified. With this information, students were then invited to connect the materiality of the object with its historical context and with different spheres of life (e.g., economy, daily life, ideology, religion, worship, art). They were encouraged to “enter into dialogue” with the object, deciphering its multiple dimensions and functions, and to co-construct their own narratives in diverse forms (e.g., written texts, digital stories, artistic creations). Traveling back in time, they imagined and recounted possible stories about how the lamp might have been used, discussed the social status of artisans in the early Byzantine period and in the commercial center of Thessaloniki, and studied the use of lamps in other cultures, identifying common elements (beliefs, myths) through cross-cultural interactions. They were also engaged in role-play, designing decorative patterns, and drawing connections between the Byzantine lamp and everyday objects in use today. Students reflected on their process—what they did, what challenges they faced, and how they could improve. Image 1 shows an extract from the multimodal e-book that students created, which describes the way the clay products were used in daily life in ancient years.



Image 1: Extract from the multimodal e-book about the usage of clay lamp in ancient years

The icon of a speaker at the top of the page is evidence of the multiple ways that students were expressed within the inclusive approach they participated. This multimodal e-book can be accessed [here](#).

Example (Artifact: Stern Knee)

Inspired by the findings of a shipwreck recovered from the coast of Belinho, Portugal, students traced the journeys of people, objects, and ideas. The activity began with the observation of an artifact found in the wreck: a wooden stern knee from the ship. Students then formulated hypotheses regarding its origin, dating, possible function, and material, and proceeded to study the object using five archaeometric methods, following the stages of inquiry.

The analysis revealed that the stern knee was made of coniferous wood, while the textile threads attached to its edge were made of silk. These elements, directly tied to the materiality of the objects, became the starting point for further research: Where and when were ships constructed from coniferous timber? Did the objects form part of the ship's equipment or its cargo? (The type of material and the absence of signs of use suggested they were cargo.) Students also explored questions about the origin, manufacture, utility, and value of the objects.

Their journey into history continued by charting possible routes of the ship, designing museum labels for the artifacts they chose to exhibit, and placing key events related to the finds and the wreck on a historical timeline. In this way, students were engaged actively in the pursuit of knowledge, assumed the role of scientist-archaeologists, and developed skills of observation, analysis, and creativity. Image 2 shows an extract from students' reports on the study of the artifact using the Scanning Electron Microscope.



Image 2: Extract from students' reports on the study of the Stern Knee

Example (Artifact: Womens' Bazaar)

Another artifact that students examined through archaeometric methods was the painting "Womens' Bazaar" from the Anastasios G. Leventis Foundation in Cyprus. Following the same inclusive, inquiry-based STEAM approach, students demonstrated their creativity by using AI tools to give motion and life to the women in the painting. In Image 3, the icon "play", characteristic of a video, is the first frame of the video. One can notice the three different women figures in the foreground as they are moving.



Image 3: Extract from the multimodal e-book about the usage of an AI tool

Example (Artifact: Those Left Behind)

The activities developed within the SciArt project are characterized by their interdisciplinary nature. The 1950 painting “Those Left Behind” from the Anastasios G. Leventis Foundation in Cyprus is thematically connected to migration and displacement. At first, students were asked to observe the painting, describe it, express the emotions it evoked, and reflect on questions such as whether and why people leave their homeland then and now, and how separation is experienced both by those who depart and by those who remain. Students then turned their attention to the vivid green color of the child’s clothing in the painting, which led to an inquiry into the materiality of the artwork. They processed and analyzed the results of five archaeometric methods, concluding that the pigment used was verdigris, while the painting itself was created on a coniferous wood panel. This detailed focus on the material aspects of the artifact became the starting point for further research into the materials used by artists of that period, the theme of the painting, exile, and the ways in which materiality can evoke emotions, such as the impact of the striking green hue. The students formulated hypotheses about the painting’s provenance and date, observed its subject matter (the figures’ postures, gestures, and facial expressions), and discussed how the interpretation was supported by scientific analysis. They also narrated stories about the lives of the people represented in the painting and expressed their creativity through role play of the scene, as illustrated in Image 4.



Image 4: Students’ role play of the painting

Students became familiar with aspects of scientific methodology and developed their critical thinking skills through the interpretation of results obtained from archaeometric methods. Furthermore, using the outcomes of the research on the materiality of objects as a starting point, they explored the artifacts from the perspective of cultural heritage, thereby fostering their creativity. Working collaboratively in groups, as illustrated in Image 5, students cultivated teamwork skills, while presenting and discussing their ideas and creations in class helped them strengthen their communication abilities.



Image 5: Students' teamwork

Multimodal or Augmented Artefacts

Students created multimodal e-books based on the data collected throughout the inquiry process. These works connected the materiality of each artifact to its historical context and to various aspects of life, such as economy, daily life, ideology, religion, worship, and art. In these books, students described their "dialogue" with the artifacts, enlightening their multiple functions and meanings, and collaboratively crafting their own narratives. These narratives took various forms, including written texts, digital stories, and artistic interpretations.

For example, by imaginatively traveling back in time, students told stories about the possible use of the clay lamp, reflected on the social status of craftsmen during the Early Byzantine period, and explored Thessaloniki as a commercial hub. They also examined how similar artifacts were used in other cultures, identifying shared elements—such as myths and beliefs—through cultural interaction. Taking on different roles, they designed patterns and connected the clay lamp to objects still used today.

Students produced multimodal books, padlets, digital presentations that included text, images, AI-generated animations, audio recordings. The outputs captured the students' inquiry-based learning processes, their engagement with archaeometric data, their creative interpretation of cultural heritage topics, and their overall educational experience.

All the e-books can be downloaded from the SciArt webpage

(<https://sci-art.eu/resources/> → Multimodal Outputs → Greece – Students' Multimodal Outputs).

Experiences from the implementation

Teachers from different disciplines (e.g., language & literature, science & informatics, and the arts) collaborated, using the results of archaeometric methods on selected artifacts as a starting point to engage their students in inquiry-based exploration and cultural heritage storytelling. The teachers acted as coordinators and facilitators in the student-centered learning process. Based on their classroom observations, they reported that all students participated actively and with enthusiasm in the inquiry-based STEAM activities. Students worked collaboratively to investigate the materiality of the artefacts and documented their process in the multimodal e-books they created. Their work displayed strong elements of creativity and imagination, as they combined archaeometric methods with narratives of cultural heritage.

Teachers successfully engaged their students in inclusive, inquiry-based STEAM activities and expressed strong enthusiasm to implement the project again with new students in the future. At the same time, they highlighted that it would be more appropriate to implement it outside of the school schedule, within the framework of an educational club or program, as the implementation requires a lot of time. It is estimated that implementation requires 8-10 hours of teaching time in the school timetable, including the completion of pre- and post-questionnaires by students. In this case, implementation took place during regular school hours and was integrated into the curriculum through the subjects of Language, History, Physics, and Computer Science, resulting in the workload being distributed across disciplines.

As an alternative approach, teachers suggested implementation in the hours of "Skills Workshops", which are part of the mandatory timetable. In the "Skills Workshops", innovative educational actions are implemented, aimed at cultivating 21st century skills, life skills, technology, engineering and science, and critical thinking. Another proposal was to implement the project with a Science Club held after school hours. However, this approach was noted to have the drawback of voluntary rather than mandatory student participation.