

SciArt case studies



Piloting and Implementation of the SciArt activities in Florina, Greece



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The Case Study of UOWM: 3rd Junior High School of Florina, Greece

Location of the Implementation

The Sci Art approach was implemented in the 3rd Junior High School of Florina city. Florina is a border town situated in northern Greece, near the borders with North Macedonia and Albania. It is located in the heart of Macedonia, next to Lake Doirani, at an altitude of about 600 meters. The city is known for its rich history, traditional culture and tradition as well as its beautiful natural scenery. Current student population of Florina is 9,500 in total at all levels of education and there are three-day secondary schools operating.

School Profile

The 3rd Junior High School of Florina is a public lower secondary school located in the city of Florina, in Northern Greece. The school provides quality education to students aged 12 to 15, focusing on academic excellence, personal growth, and social responsibility. It is renowned for its active, community-centered educational approach. The school is renowned for its active, community-centred educational approach in cultural, environmental, and European programs, encouraging students to develop creativity, teamwork, and respect for diversity. The dedicated teaching staff supports the students' academic journey while promoting values of citizenship and lifelong learning. More specifically, the school has participated in European initiatives such as IHRA's "My Hometown" project, exploring local Jewish heritage through archival research and exhibitions. Also, in respect of environmental & wildlife protection the school has developed a collaboration with ARCTUROS Wolf-Lynx Centre and a German partner school. During the project students "adopted" a young female lynx named Missi, symbolically supporting conservation and cross-border awareness via the Erasmus+ "Two Nations, One Nature" program. Finally, for four consecutive years, the school earned commendations in the National Pontian Greek Heritage Competition, notably receiving recognition in 2021 for preserving regional historical artifacts and oral traditions.

Teaching Staff Involved

During the implementation of the suggested Sci Art approach, a multimember team from the schools' teaching staff was engaged, contributing their expertise in various fields. In particular, three subgroups were formed as follows. The core Sci Art group which consisted of Mrs Anastasia Dampali (English Language), Mrs. Maria Douitsi (Philology), Christina Karagianni (Philology), Mrs Ioanna Konstantinidou (Philology) and Mr. Charalampos Chrysochoidis (Visual Arts). This group focused mainly in implementing the suggested STEAM approach. The second group with Mrs Anna Sperkou (Computer Science) and Mrs. Eleni Papagiannaki (Biology) put emphasis in possible connections and interrelations of the Sci Art activities with the active citizenship curriculum recently introduced by the Greek Ministry of Education. Finally, Mr. Charalampos Chrysochoidis holds a master's degree Cultural Studies and Information Technologies and coordinated the project together with Mr Sperkou kai Mrs. Papagianni. He was particularly involved in Digital Design Editing and Mrs. Anna Sperkou in 3d printing procedures. The above-mentioned interdisciplinary team combined Science, Art, Technology, Languages, and Civic Education to promote student creativity, innovation, and active citizenship.

Student Participation

Students of both second (2nd) and third grade (3rd) of the school participated in the project. The total

number of students engaged in the Sci Art approach was approximately 110 while a smaller group of seven (3 representatives of the 2nd grade and four of 3rd graders) had a more active role during 3d printing procedures.

Artifact(s) Under Investigation

List the artifact(s) of the project used in the implementation.

- Silver coin, Julius Caesar Denarius, Museum of Espozende, Portugal

Classroom Activities

The content of the Sci-Art program served as the inspiration for the implementation of an educational project aimed at fostering active citizenship among students of the 2nd and 3rd grades at the 3rd Junior High School of Florina. The project was incorporated into the Active Citizen Curriculum, which is structured around 17 thematic units corresponding to the 17 Sustainable Development Goals (SDGs). In this case, the focus was placed on Goal 4: Quality Education.

Specifically, the study of an ancient [Roman coin](#) inspired students to create a visual arts-based “Coin Museum” through interdisciplinary approaches that linked science with the arts, with a special emphasis on the educational use of archaeometry.

The main objectives of the project were:

- To help students understand the interdisciplinary nature of the topic, combining science, art, and cultural heritage.
- To develop artistic skills by designing an ancient coin—either real or imaginary.
- To present the outcomes of the project with the ultimate aim of enhancing students’ self-esteem and ensuring their equal participation in the learning process.

The implementation of the program was divided into six phases explained as follows:

Phase 1. Historical Research

During this phase, students conducted a historical and spatiotemporal research of the selected coin artifact, chosen from among list of artifacts provided by the Sci-Art program. More specifically they conducted research on printed and online material about trading routes of their area during Roman times and Byzantium. Teachers with history and philology background guided this research posing critical questions to enhance students’ interest and orientate their inquiry. Some indicative questions were:

- ✓ How did the Via Egnatia contribute to cultural and economic exchange across the Roman Empire, and how might such networks compare to modern transportation routes?
- ✓ Why do you think coinage was an important medium of communication and power during Roman and Byzantine times?
- ✓ How do artifacts like coins help us better understand the relationship between past and present societies?

Their research was directed towards Via Egnatia, one of the most important ancient Roman roads, built in the 2nd century BC to connect the Adriatic Sea with Byzantium (modern-day Istanbul). Stretching over 1,100 kilometers, the road crossed the Balkan Peninsula, linking the western and eastern parts of the Roman Empire. The Via Egnatia started from the port city of Dyrrachium (modern Durrës in Albania) and passed through key cities such as Thessaloniki, Philippi, and **Heraclea Lyncestis** near modern Florina, before reaching Byzantium. It served as a vital route for trade, military movements, and cultural exchange, significantly contributing to the spread of Roman civilization in the region. Parts of the ancient

road still survive today, while the name Egnatia Odos has been given to the modern Egnatia Highway (A2), which follows a similar path across Northern Greece, continuing the historical importance of this ancient route.

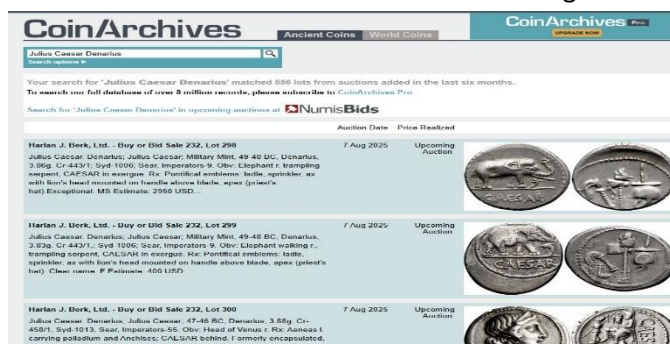


Additionally, they realized there was a need to study furthermore about their nearby ancient city called **Heraclea Lyncestis**, an important part of their local history, which flourished during the Hellenistic and Roman Period. The city held strategic military and commercial importance, as it controlled key passes leading towards Illyria and Pelagonia. It became known for its artistic achievements and particularly for its coinage, which often depicted the figure of Heracles. It was founded in the 4th century BC by King Philip II of Macedon, the father of Alexander the Great. It was situated in the region of Lynkestis, one of the four principal regions of Upper Macedonia, along with Orestis, Elimiotis, and Pelagonia. The name Heraclea was given in honor of Heracles (Hercules), the mythical ancestor of the Macedonian royal family. Today, the ruins of the city can be found approximately 2 km south of Florina, in the area known as Paliokastro (Old Castle). This information lead to a new cycle of inquiry for students trying to find more answers to key questions raised e.g. How might the geographical location of Heraclea Lyncestis influence trade, politics, or culture in both ancient and modern contexts?



- ✓ What parallels can you draw between ancient communication through coinage and modern forms of cultural representation (e.g., banknotes, digital currencies)?
- ✓ If you were a merchant traveling along the Via Egnatia in Roman times, what challenges and opportunities would you face?

During this phase, students also researched about the specific coin in an online platform called [Coin Archives](#) which is one of the world's largest repositories of information and search engine dedicated to ancient, medieval, and modern coins. In order to find more information about the origin of the specific coin, its value, symbolism e.t.c. In the specific database students could search for specific coins (e.g., ancient Greek or Roman coins). Study the iconography, mythology, and symbolism found on coins and additionally see how the same coin has been sold across different auctions over time. The specific database is a valuable tool for the study of



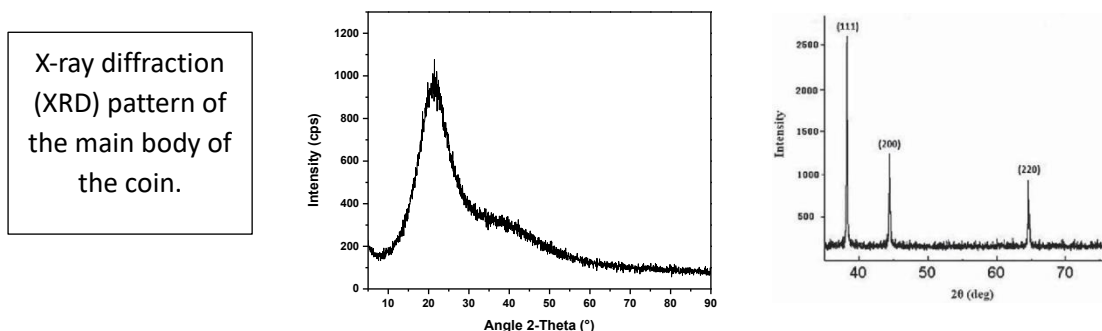
ancient numismatics and can be helpful when designing and creating artistic or 3d representations of historical coins.

Phase 2. The Science study of the artifact

During phase 2, students guided by their teachers, conducted inquiry activities suggested by the provided material of Sci Art program (student worksheets) following step by step the archaeometry methods suggested such as optical microscopy, electron microscopy, EDS, FTIR and XRD analysis based on Pedaste et al. (2015) model of inquiry.



Students using the augmented reality tools got acquainted with the archaeometry methods and had the chance also had the opportunity to use specialized measuring instruments through augmented reality simulations—tools that are rarely accessible in real-life laboratory conditions. This experience allowed students to observe how scientists work: making predictions, constructing hypotheses, and then verifying or rejecting them through experimentation. In this way, they were able to study the specific exhibit with a truly scientific approach—something that would have been impossible under normal circumstances. Students analyzed produced data finding useful information about the artifacts material dimension- the coins consistency, value and possible origin (e.g Clay-silicate and limestone components of the soil in the area that the coin was originally found before moving to the museum).



Phase 3. The artistic creation

In this phase students, with their teacher's guidance, embarked on a creative journey of art to design their own unique coins, drawing inspiration from their imagination and inventive spirit. They also enriched their work with images of authentic historical coins they discovered online, adding depth and context to their creations. Some indicative examples of their creative work are presented.

Students Creations



The final result thrilled the students, who decided it would be meaningful to share their work with the rest of the school and its visitors. They set out to create a museum-style exhibition space in a shared area of the school, where guests could explore the wide variety of coin designs proudly displayed.

Characteristic Aspects of the school's exhibition



Phase 4. Another Science Inquiry cycle -Using a traditional microscope

During phase 4 students were engaged in a new inquiry cycle using a real-life microscope available at the school science laboratory, to see the way that the instrument works and possible information that may offer when used to search the material aspect of objects. Students guided by their biology teacher in groups and using worksheets focused their research on using microscopes to study three types of samples-leaves from the dragonia plant, yeast and onion petals. The first activity involved studying the plant of dragonia. Students, using three available microscopes, observed the morphology of the plant trying to identify possible visible "stomata" on the lower epidermis of the leaf. Next, they tried peeling off a thin layer of the leaf surface and staining with iodine or methylene blue. The specific activity enhanced students' skills to identify typical features of plant cells. In the next activity students were engaged with microscopic observation of yeast samples, staining them with methylene blue to visualize nuclei and cell membranes. Finally, during the third activity students examined microscopically onion epidermal cells stained with iodine. The educational goals of the combination of the three activities mentioned, were developing classification and observation skills and understand the diversity of life by comparing members of different biological kingdoms: *Plantae*, *Fungi*, and more.



selection of the specific

samples was carefully planned to enhance students scientific thinking on how they can form hypotheses, record data, and draw conclusions — core elements of the scientific method.

The integration of a traditional microscope use in Sci-Art project combined with augmented reality instruments, offered students a unique opportunity to combine scientific inquiry with creative expression as an additional feature of the project. This cross-disciplinary approach offered several benefits like visualizing also in real life, abstract concepts which became tangible, fostering deeper understanding and long-term retention. Students gained also besides



augmented reality implementation, hands-on experience with scientific instruments and procedures. They developed essential skills like accuracy, patience, attention to detail, and methodical thinking — all vital in STEAM education.



Phase 5. 3D Printing of coins created by students and Museum visit

During phase 5, students had the chance to be introduced to the procedures of three-dimension printing in the school's laboratory. Their teachers specializing on Computer Science and Visual arts presented them the basic elements and operating principles of their 3d printer (Ultimaker 2+), and common and useful freeware image editing and slicing software (Gimp 2.10.12 and Ultimaker Cura

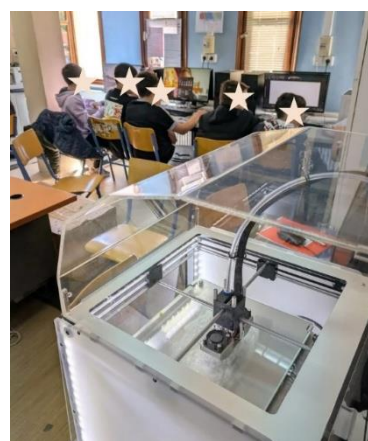


5.10.0). Students saw the way their own coins can be edited digitally and brought them to life through 3D printing. The process involved using specialized design software to edit detailed digital models of student created ancient or imaginary coins, which were then prepared for 3D printing.

One of the main challenges was the need for precision in the design phase, as small details can be difficult to reproduce accurately in the final printed object. In addition, students had to understand the limitations of the 3d printer, such as the resolution, material type, and size restrictions. Some designs required adjustments or multiple printing attempts to achieve the desired result. The process taught students patience, problem-solving, and the importance of trial and error when

working with new technologies.

Ultimately, the experience allowed students to combine creativity with technology, producing tangible outcomes that enhanced their confidence and engagement in the learning process. 3D printing coin designs empowered students to learn by doing, blending STEAM skills with cultural reflection. It brings history off the page and into their hands, strengthens technical creativity, and boosts self-confidence—perfectly aligned with Sci-Art's mission to integrate science, art, and cultural heritage.



As part of the educational process, a group of students also visited the Archaeological Museum of Florina, where they had the unique opportunity to study ancient coins that the museum had recently



acquired and was in the process of identifying and classifying. This hands-on experience allowed students to observe authentic archaeological artifacts up close, learn about the methods used by archaeologists to authenticate and study ancient coins, and draw inspiration for their own creative projects. The visit reinforced the connection between cultural heritage, scientific research, and artistic expression, which lies at the heart of the Sci-Art approach.

Phase 6. Communication and dissemination

During the last phase of implementation, the outcomes of the program were shared within the school community and beyond. As part of the project dissemination activities, the students of the 3rd Junior High School of Florina participated in the [14th Digital Creativity Festival of the Prefecture of Florina](#), which was hosted at their own school premises. During the festival, students had the opportunity to present their creative work and to showcase the innovative use of technology and art through their 3d-printed coin designs. You can find a more detailed version of the event [here](#) and the specific project presented on the schools' webpage [here](#). Additionally a characteristic video of the schools' activity has been created that is available on the link [Sci Art- Active Citizenship and 3d Printing](#).



Moreover, the application of the Sci-Art interdisciplinary approach, as it was implemented in the specific school, was presented during the dissemination event held at the University of Western Macedonia. The event brought together all the schools both from primary and secondary education involved in the program, university students, and academic staff. The presentation highlighted the objectives, methodology, and outcomes of the project, while offering participants the chance to exchange ideas and reflect on the educational value of combining science, art, and cultural heritage.

Student-Produced Multimodal or Augmented Artefacts

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

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

Experiences from the implementation

The implementation of the Sci-Art project at the 3rd Junior High School of Florina highlighted the true value of interdisciplinary education, bringing together diverse fields such as science, technology, art, and cultural heritage. The collaboration between teachers of different specializations fostered a

creative and dynamic learning environment, allowing students to explore new knowledge through multiple perspectives. The project successfully sparked students' interest in science, technology, and cultural heritage, offering them the chance to engage in meaningful, hands-on activities that made learning both enjoyable and impactful. Students realized that scientific observation and artistic creation both require curiosity, careful attention, and interpretation — reinforcing the idea that science and art are complementary ways of understanding the world. Implementing Sci-Art context did not only deepen students' scientific understanding, but also invited them to see science as a source of inspiration, creativity, and personal expression. It encouraged building a strong foundation for both scientific literacy and artistic exploration.

Throughout the project, several challenges emerged. One of the main difficulties was the limited timeframe of approximately 3 to 3.5 months, due to the constraints of the regular school curriculum and other school obligations. Managing large groups of students—involving all six classes of the 2nd and 3rd grades—also posed organizational challenges. Additionally, the technical demands of 3D printing, which required significant time for design, troubleshooting, and printing, added to the complexity. Despite these obstacles, the project was brought to life thanks to the enthusiasm, dedication, and teamwork of the participating teachers. Their positive attitude, passion for innovation, and collaborative spirit played a key role in the project's success. Teachers' addressed the challenge of large student groups by dividing them into smaller ones and assigning specific roles. For example, a smaller group of seven students (three representatives from the 2nd grade and four from the 3rd grade) took a more active role during the 3D printing procedures, while another group carried out the visit to the archaeological museum. The students responded with excitement and participated actively to the assigned roles. The showed particular interest in the hands-on activities, which motivated them and strengthened their engagement in the learning process. In the end, the Sci-Art project proved to be a rewarding educational experience, demonstrating how interdisciplinary collaboration can inspire both students and teachers alike.

