Educational and Experiential Activities, for Students and Teachers of Mathematics and Sciences, in a Classical Museum of Archeology

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Abstract

The Museum of Archeology in Gan-Hashlosha was inaugurated on an ancient biblical mount in the early 1960s, in the heart of a spectacular national park in the western part of the Beit She'an Valley. The museum collects and displays archeological collections and ancient artifacts, representing many ancient that thrived along the shores of the Mediterranean Sea and the Aegean Sea. Those cultures include Minoan, Mycenaean, Classical Greece, Etruscan, Roman, Persian, Egyptian and more. The museum also displays archaeological artifacts from excavations in the Beit She'an Valley. Dan Lifschitz, a Swiss citizen living today in Italy, donated this exotic collection. The exhibits are rare and spectacular, as can be seen only in the world's most important museums. Many students, from kindergarten to K12, who have interest in history, archeology, Bible, etc., visit this archeological museum. We propose here a novel approach to the study of science as enrichment and the integration of exact sciences and life sciences, archeology, and ancient art. This activity, beyond the educational experience, demonstrates to both students and teachers that it is possible to combine and use mathematics, geochemistry or biology, even in archaeological research and in museum exhibitions. Here, students can learn the potential in integrating other scientific fields. The activity shows them that their future occupations will probably be interdisciplinary. We will gradually introduce the full program, which will progressively adapt for all ages of kindergartens to K12 and their teachers in the relevant fields.

Keywords: Archeology, Museum, Mathematics, Sciences.

Background and introduction

The Museum of Archeology at Gan - Hashlosha was founded on an ancient biblical mount in the early 1960s, in the heart of a magnificent national park, in the western part of the Beit She'an Valley. [1]. The museum is based on archaeological collections and ancient artifacts, representing many ancient cultures that thrived along the shores of the Mediterranean and the Aegean Seas. Among other cultures were the Minoan, Mycenaean, Classical Greece, Etruscans, Roman, Persian, Egyptian and more. [2]. The museum exhibits also archaeological artifacts from excavations in the Beit She'an Valley. The foreign collection was donated by Dan Lifschitz, a Swiss citizen living today in Italy. The exhibits are rare and spectacular, as can be seen only in the world's most important museums. Many students and children's visit the archeological museum: history, archeology, Bible, etc. We propose here a new and original approach to the study of science as enrichment and the integration of exact sciences and life sciences, archeology and ancient art. This activity, beyond the educational experience, illustrates to both students and teachers that it is possible to combine and use mathematics, geochemistry or biology, even in archaeological research and in museum exhibitions, in connection with the archeological artifacts presented therein.

Mathematics - The museum exhibits colorful geometric tools. The students can identify the geometric forms and the repetitive patterns in the decoration. ([3],[4],[5],[6],[7]). Triangles and other patters, angles and so on. It is also possible to calculate volumes of tools, weight and specific weight of an item according to volume and type of stone.

Examples of mathematical tasks in an archaeological museum:

1) The students will look at ancient pottery vessels decorated with geometric patterns. (e.g,, the geometrical Minoan instruments that are in the museum's displays), then they will search for repeating motifs such as the Meander model or spirals, and will tell the types of triangles and assign them to groups.

2) The students will take a particular pottery, measure the height and diameter of the base, the center of the body and the rim. Based on the data obtained, and without prior knowledge, they will be able to determine the type of the tool and its functional use. For example, if the tool is relatively high and has a small diameter, it might be a glass, a vase, a teapot or a vessel with a similar function. On the other

hand, if the item is relatively low, with a large diameter it might represent a bowl or a pot. If the vessel is relatively high with narrow bottom and lip with a potbelly in the middle it indicates that it is a storage vessel: a jar, a gap, etc. Thus, students receive and internalize concepts of proportions and functionality. They understand that our ancestors also practiced mathematics, engineering, and proportion, although they did not always call the profession by name.
3) Specific volume and weight: Students will choose for example a stone pillar which is actually a cylinder. They will measure the diameter and calculate the radius ($3.14 \times r^2$), measure the length and calculate the volume of the item. Similar activity will be done with another object in the form of a cube or a rectangle. There will be measured length X height X width. Once they have identified and measured the volume of the item, they will examine the specific gravity of the material: limestone, basalt, granite. This is how the absolute weight of the item will be calculated, without having to consider it in practice. (This activity is suitable for high grades in high school and perhaps junior high for young people ([8-16]).

Chemistry and Geology - The museum exhibits many stone items and minerals. Including limestone and dolomite, basalt, marble, granite, alabaster, soapstone and more. Students identify the material, learn why it was chosen for a specific purpose, action or tool such as grinding tools, foundations for structure, sculpture and art, and so on. According to the computer material, the level of difficulty, weight, means of lifting, difficulty in quarrying and transport (depending on the degree of difficulty), secondary use, water conditioning and surface conditions, the museum also exhibits minerals from around the world, can be divided according to shape and properties of material, Science and daily life.

Biology and Nature - The museum exhibits a variety of animals of all kinds and species, with a variety of zoomorphic tools. They represent the animal world as seen by human societies in the past. The animals appear as colorful pottery vessels, figurines, reliefs, paintings on vessels, mosaics, architectural elements and more. All types of birds, wild beasts, domestic animals, reptiles, rodents, mythological animals, and more are visible. Students and teachers of biology identify the species from the animal world, sort out, distinguish the artifacts and the small details, and compare the animals that lived in the past with those that live today, sometimes in the museum garden. In the beginning, there is an opening meeting for the entire class. The students are shown two tools: an earthenware cultic tool with snakes and a stone lintel in which a lion is entangled between the vine leaves.
They discuss the 2 animals, their nature and meaning to man, and the myths connected to those animals: dangerous, cunning, strong, the king of the animals, lives close to man or wild in the forest. The students are divided into work groups, walk around with identical pictures in the museum halls, and identify the animals on the ports in the potteries artifacts. Then they summarize with each group / class and perform a shared memory game with animal pictures, from the museum exhibits. Students in mature classes and art trends can learn more about the techniques of painting and sculpture, real proportions of the animal, what symbolizes complex characterization of families and species, mythological and imaginary animals and more.

Preliminary summary

We present here a new and unique approach to expanding the topics studied in the Museum of Archeology, using the diverse and rare artifacts presented in the Museum of Archeology in Gan Hashlosha. The activity will be gradually adjusted for all ages of kindergartens, elementary school classes, teaching students and teachers in the relevant fields. The activity relates to the Ministry of Education's curriculum, but greatly enriches the experience, imagination, functionality, and beauty of those theoretical subjects that are difficult for the student and require effort and greater concentration in their learning. We present here initial and innovative sessions as an example and illustration of potential. They can be expanded and enriched for almost any age and in many fields, including enrichment and expansion of knowledge for teachers and students of teaching. Activity Illustrates to the student and the teacher the interdisciplinary aspects of study and research in academia, science and other areas of life, which the student will meet in the future, in his adult life. The activity can also be expanded to archaeological sites, excavations, conservation and survey work and other field studies in archeology, history and art, combined with mathematics and science.

Fig1: Group of geometry items

Fig 2: Group of zoomorphic items

Fig 3: student learn at the museum

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