**Title**

Mycenean Age

**Author**

Sofia Gkemisi, Maria Nikita

**Summary**

The students acquire knowledge about the historical context of the Mycenean age, the Mycenean political and social system and the Mycenean architecture and culture. They learn how to work in groups, how to do research, and how to use technology in the classroom.

**Learning domains involved and prerequisite knowledge of students**

Science, Technology, Engineering, Arts and Mathematics.

Students should already be familiar with 3D design - they should have already taken two or three lessons in Tinkercad.

**Questions based on student experiences**

Having completed the project, students should be able to answer real-life questions such as the following:

* How can I find information on a topic?
* How can I evaluate a source so that I know the information is reliable?
* How can I collaborate with others so that we can complete a project?
* How can I make the most of existing web tools so that I can learn more effectively and present my work in the best way possible?
* How can I present what I have learned in a simple, clear and direct way?
* How can I reflect on learning experiences so that I can become a better learner in the future?

**Aim and objectives of the scenario**

***Knowledge-based goals***

*● Recognize the Mycenean political and social system.*

*● Distinguish and analyse the social structure of the Mycenean age.*

*● Recognize the architectural elements of the Mycenean acropolis.*

***Skill-based goals***

*● Create 3D models in Tinkercad.*

*● Create AR books.*

*● Create AR quizzes.*

*● Create activities using ICT tools.*

***Affective goals***

*● Adopt positive attitude towards collaborative activities.*

*● Adopt positive attitude towards ICT tools.*

*● Adopt creative thinking, collaboration and communication skills*

**Link to STEAM careers**

The skills developed by this scenario possibly connect to some STEAM careers, as:

* Archaeologist
* Civil engineering
* Architect
* Teacher
* 3D artist
* Designer

**S**: Students become familiar with History as a social science and Computational Science as an applied science. They also use basic research as a part of scientific research.

**T**: In the various stages of the project, students become familiar with a range of software and web tools such as Genially, Metaverse Studio, Quizizz, ARTutor, PowerPoint etc.

**E**: Students study the structure of Mycenean monumental architecture, and how the shape of the buildings helped with their stability (e.g. the vaulted tombs).

**A**: Students become familiar with Tinkercad, which they use to design the Mycenean buildings. These buildings are printed by the school 3D printer.

**M**: Students have to use Mathematics in order to properly design the various ancient buildings on Tinkercad.

**Students’ Age**

*12-13 years old*

**Duration – Time needed**

**Computer Science lessons:** Approximately 9 teaching periods (45’x 9).

**History lessons:** *The entire project lasted between mid-October and almost the end of the school year (mid-May). During that period, students spent at least one full teaching period (45’) per week on completing the various stages of the project.*

**Educational Resources (Tools & Materials)**

**Materials:** digital dictionaries, Wikipedia, the school book, educational sites

**Tools:** Tinkercad, ARTutor, Metaverse Studio, MS PowerPoint, Genially, Crossword Labs

**21st Century Skills**

**Collaboration**: The project is structured in such a way that students have to work together in order to pool their knowledge; they have to rely on each other in order to make sure they have understood everything so they can work on the deliverables.

**Communication**: Communication is central to the jigsaw 2 approach. Students have to give mini presentations in order to explain to their group mates what they have learned, while they also have to ask each other questions in order to clarify things they were uncertain about. They have to communicate effectively so as to complete their group quizzes, designs, presentations, booklet, etc.

**Creativity**: Students use their creativity while preparing the booklet using ARTutor (e.g. page design, picture selection etc.) or designing the ancient buildings in Tinkercad. They also have to be creative in generating questions for the Quizzes they prepare for their classmates, as well as in creating the AR quizzes in Metaverse Studio .

**Critical Thinking**: Students have to use their critical thinking faculties in order to evaluate the various sources of information and to determine which are reliable and can be safely used.

**Teaching approaches and learning strategies/theories**

* Jigsaw 2 collaborative strategy
* Learning by design

**Class Organization/Management**

**During the History lessons:** The classroom needs to be organised in such a way that students can collaborate effectively, without disturbing their classmates in other groups. To that end, the desks have to be rearranged so as to create mini-hubs, where students can talk while facing each other while also being able to look at their tablets. The hubs need to be kept some distance apart, so that the teacher can circulate freely among them in order to engage in trouble-shooting and to provide assistance to students where necessary. The classroom arrangement needs to be changed from time to time in line with the requirements of the project.

**During the Computer Science lessons:** Lessons take place in the Computer Laboratory. Class is organised in groups of preferably 3 students, but groups of 2 to 5 students are also acceptable. In a few cases, there are students that insist on working alone, which is something that has to be respected. Each computer corresponds to one student. Although, depending on the application they use each time, students can collaborate either from their own computer online, or work together using the same computer. For example, while working in Tinkercad, students can collaborate synchronously on the same design from different computers. The members of each team should use computers which are close to each other, so that they can talk. In some cases, one member may use his/her computer to find information, in order to help the other member(s) to design their building or create their AR quiz.

**Platform:** All the students have accounts to the school digital platform (eg. Moodle), where they can find any useful files uploaded by the teachers, as well as they can upload each time their deliverables.

**Description of the scenario's activities**

***History – 1st activity - 1st step***

*activity goal: building new knowledge using video*

*The teacher shows a video on the interactive whiteboard (Chapter 2: Mycenaean world* *https://youtu.be/j6TVQ9vacRI* *)*

*Ιn class the teacher discusses with the students about the social, political and financial organization, the monumental*

*architecture (chamber tombs, palaces, cyclopean walls).*

*Every team announces to the plenary session/whole class the two common subjects which they opted for.*

*Next, you hand out your notes to your team and you all together search for information from the digital resources you have been handed out on two common subjects you have agreed on.*

*(Discovery and cooperative learning- 1st step jigsaw – original/first (initial teams)*

*Write down on a piece of paper whatever you judge as important from the video (individual activity)*

***History – 2nd activity – 2nd step***

***1st expert group, 2nd step jigsaw: Historians***

*The teacher's role is supportive. He watches the work procedure of each team and supports when needed without getting*

*intrusive.*

*We divide the students into groups according to the chosen subject. Every team decides and gives a name to themselves*

*ie Historians.*

*Every team (expert group jigsaw) after having seen the video the team studies and seeks for information from the internet or*

*digital books.*

***A) About civilization and chamber tombs -1st expert team.***

*The teacher hands out work papers to each team and directions to the members of the team.*

*Every team decides on its chief and secretary who will write down the procedure and completion of work done.*

***2nd expert group,2nd step jigsaw: Myceneans***

*Every team (2nd expert group, 2nd step jigsaw) after having seen the video studies and seeks information from digital dictionaries Wikipedia, the school book, or from digital resources provided by the teacher.*

***A) About the Mycenaean's society structure expert team.***

*The teacher hands out work papers to each team and directions to the members of the team. Sample questions:*

* *Which were the social problems of that era in the Mycenaean city?*
* *How would you feel if you lived during that era and you belonged to the farmers or the breeder class (demos state)*

*Testify your answers.*

***3rd expert group, 2nd step jigsaw: Architects***

*Every team (expert group- 2nd step jigsaw) after having studied the given source seeks for more information from digital dictionaries wikepedia, or from digital encyclopedias proposed by the teacher.*

***A) The teacher hands out worksheets about the monumental architecture and the cyclopean walls to each team and gives instructions to the members of each team.***

*Sample questions:*

* *What do you know about mycenean architecture?*

*Study the source and answer the question. Your answers should be based on your historical knowledge*

***4rd expert group, 2nd step jigsaw: Scholars***

*Every team (expert group-2n d step jigsaw) after having studied the given source the team seeks for more information from digital dictionaries Wikipedia, or from digital encyclopedias or educational sites proposed by the teacher.*

*A) About the Mycenean script (linear B).*

*Εxpert group 4.*

*The teacher hands out work papers to each team and directions to the members of the team sample questions.*

*After having watched the video and according to whatever you have been taught in class study the paraphrase and in*

*cooperation with your team answer the following questions.*

*1. What do you know about the Mycenaean script?*

*2.What kind of information can we distract about their life and civilization?*

***History – 3rd activity – 3rd step***

*During this phase, the members of each group (expert groups) return to their original groups (initial groups) in order to share their newly acquired knowledge.*

*These groups are now called (jigsaw groups - 3rd step jigsaw) because they have acquired specific knowledge.*

*Each member of the new group (jigsaw groups) shares his/her knowledge with the other members of his group.*

*Now all members have knowledge of all the topics discussed in the expert groups in the previous step (expert group -2nd step) and thus have knowledge of the entire chapter of History: "Mycenaean World".*

*The members of the team exchange information*

*a) about social and political structure b) architecture of the palace c) Mycenean civilization and scrip.*

***3rd Activity (1st jigsaw ομάδα)***

*The students then create an augmented reality quiz with questions about the whole of the historical chapter (Metaverse). The quiz can be taken individually, or in groups or as a whole-class activity.*

*The quiz is used as a basis to evaluate both the individual students and the teams as a whole (team recognition).*

***3rd Activity (2nd jigsaw group):***

*Members of the 2nd jigsaw group, after exchanging information, they create a crossword according to the*

*crossword labs software which includes information from the whole studied historical chapter.*

*Members of the 3rd jigsaw group create a digital game Monopoly includes information from the whole studied historical chapter.*

*Members of the 4th jigsaw group create a definition map using the c - map tool or using MS Word .*

*The definition map will include information from the whole studied chapter.*

***History – 4th Activity – 4th & 5th step***

***4th Activity ( jigsaw group)***

*All teams display their work interactively or create an augmented reality cooperative book using the ARTutor software*

*The work of every team is included in the book and all the students have access to this information.*

*The students discuss the written information and the work they have completed with the teacher and they draw general conclusions.*

***History –Final evaluation activity***

*At the end of the chapter, the teacher can hold a general revision session to evaluate whether the students have mastered the information contained in the chapter on the Mycenean World.*

*The students are evaluated by means of gap-filling and matching quizzes.*

*Final deliverable: students are asked to create a paper or clay model of the cyclopean walls, a chamber tomb, a palace and the linear B tablets.*

**Computer Science – 1st activity – Parts of Mycenean acropolis**

***The teacher presents to the students the following videos:***

*https://www.youtube.com/watch?v=N6lql79zwfs*

*https://www.youtube.com/watch?v=j6TVQ9vacRI*

***Students navigate the following sites:***

*https://ancientathens3d.com/el/mycenaean-athens/*

*https://tinyurl.com/mu4728k7*

*The teacher helps the students to make a list from the parts of the Mycenean acropolis, such as: cyclopean walls, houses, graves, palace (Megaron, courtyeard, buildings with administrative functions, warehouses, residences of the royal family).*

**Computer Science – *2nd activity – Student groups / Joining a Tinkercad classroom***

*Students are divided into groups. Each group chooses a part of the Mycenean acropolis from the list they had made during the previous activity.*

*Students are already familiar with Tinkercad – an application for 3D design – as they have already taken some lessons in it during the present school year. They have already completed all the starter projects and they have designed houses and pencil stands.*

*The teacher has created a Tinkercad classroom. He/She shares the classroom link to the students to join and he/she gives them instructions about the activity.*

**Computer Science *– 3rd activity – 3D design of a part of Mycenean acropolis***

*Each group joins the Tinkercad classroom and starts designing the part of the Mycenean acropolis they have chosen. One group member can share the design link with the rest of the members. So, everyone in the group can collaborate on the same design synchronously or asynchronously.*

**Computer Science – 4th activity – Combining the parts of the Mycenean acropolis / Maquette**

*When all groups have completed their designs, the teacher – with the students’ help – copies all the different designs into one new design.*

*The designs are resized and moved appropriately. In that way, the Mycenean acropolis is completed. Any corrections are made by the students.*

*Each group’s design is sent to the school 3D printer to be printed.*

*All students together make a maquette consisting of all the Mycenean acropolis buildings that have been 3D printed.*

**Computer Science*– 5th activity – Presentations***

*Each group creates a presentation about Mycenean acropolis and the building they have already designed in Tinkercad. Their presentation has to include pictures of their 3D design, downloaded from Tinkercad. The teacher merges appropriately all the presentations in one file, in order to have a single booklet about the Mycenean acropolis.*

**Computer Science*– 6th activity – Augmented Reality Book***

*Each group creates an account in AR Tutor and they upload their presentation (as a pdf file). Students export their 3D designs (the buildings of the Mycenean acropolis) that they have made in Tinkercad, in glb type of files and they add them as augmentations in their Augmented Reality presentation. Meanwhile, the teacher uploads the single booklet about the Mycenean acropolis (6th activity) in AR Tutor. He/ She adds as augmentations all the glb files of students' 3D designs. As a result, a total AR Book of the Mycenean acropolis is created. Students can test the augmentations in this book using the AR Tutor 4 application with the teacher’s help.*

**Computer Science*– 7th activity – Augmented Reality Quizzes***

*The teacher shares account credentials with all the student groups in Metaverse Studio. Each group creates an AR quiz about the Mycenean age and the Mycenean acropolis. Students are given tablets to test their AR quiz and make any corrections or improvements.*

**Computer Science – 8th activity – QR Codes**

*Students print QR codes for the quizzes they created in Metaverse Studio.*

*Students print a QR code for the augmented reality book they created in AR Tutor.*

*Students put the QR Codes on the maquette.*

*Students present their maquette to other students and parents in their school during the “Project Day” at the end of the year.*

**Student Evaluation Methodology**

**Initial Assessment:**

As we did not expect students to be at all familiar with the topic (the Mycenean civilisation) we only conducted a brief, informal quiz at the very beginning. This showed us that, indeed, students knew very little about it – except for some general knowledge about the time-frame and where its centre was.

**Formative Assessment:**

The teacher continuously monitored the students and kept track of how their knowledge grew. For instance, once students had watched the original documentary, there followed a discussion from which we recorded what the students remembered. Also, following the expert groups stage, we gave students some low-stakes quizzes to see what they had learned in groups.

**Final Assessment:**

Once all the stages had been completed, we evaluated what the students had learned on the basis of the final deliverable (the book) as well as on the basis of some quizzes we gave them to ascertain how well they had mastered what they had studied.

**Scenario Evaluation**

*Describe the methods you will use to get feedback from teachers and students on how well the scenario was received by students and implemented*

***Students’ comments.***  As the teachers kept a close look on the groups at every stage, they were able to see how the students responded, which activities they liked best and where they encountered difficulties. Furthermore, upon the completion of the project, students were asked to write a short paragraph about their impressions of the whole process, what they felt they had learned and what they would have liked to be different. Generally students were enthusiasted. It was indicative of the students’ excitement that during the “Project Day” celebration which took place at the end of the year, all the students were keen to present their work.

***Teachers’ Comments.***Throughout the whole period the teachers kept a journal, in which they recorded their impression of how things went, what problems they were encountered with, as well as ways in which they thought the educational experience could be improved. With the completion of the project the teachers replied to a series of open-ended questions evaluating the project as a whole and offering suggestions about how it could be made better still.

**References**

Aronson, E., Blaney, N., Stephan, C., Sikes, J., & Snapp, M. (1978). The jigsaw classroom. Beverly Hills.CA: Sage Publications, Inc.

Conley, S. & Muncey, D. (1999). Teachers talk about teaming and leadership in their work. Theory into Practice 38(1), 46.

Coşkun, T. K., & Deniz, G. F., (2022). The contribution of 3D computer modelling education to twenty-first century skills: self-assessment of secondary school students. International Journal of Technology and Design Education, 32, 1553–1581.

Cultivation of Critical Thinking and Oral Communication Skills. International Journal of Teaching and Learning in Higher Education, 19, (2), 183-190.

De Graaff, E., & Kolmos, Α. (2007). History of problem-based and project-based learning. In Management of change, ed. E. de Graaff and A. Kolmos, 1–8. Rotterdam: Sense.

De Wever, B., Schellens, T., Van Keer, H. and Valcke, M. (2008). Structuring Asynchronous Discussion Groups by Introducing Roles: Do Students Act in Line With Assigned Roles?, Small Group Research, 39(770).

Gkemisi, S., Paraskeva, F., Alexiou A. & Bouta H..: Designing a PBLJii Script in a CSCL Enviroment for Bolstering Collaboration and Communication skills. Springer International Publishing Switzerland 2015. L.Uden et al. (Eds.): LTEC 2015,CCIS 533,pp.77-92 (2015).

INGER, M. (1993). Teacher collaboration in urban secondary schoolsERIC/CUE Digest #93. (EBSCO Report # EDO-UD-93-7).

Lombard, R., & Biglan, B. (2009). Implications of Role Play and Team Teaching as Strategies for Information Technology Pedagogy, Information Systems Education Journal, 7(20).

Pacific Policy Research Center, (2010). 21st Century skills for Students and Teachers. Honoloulou: Kamehameha Schools, Research & Division.

Pearson, A. P., & Dubé, A. K., (2021). 3D printing as an educational technology: theoretical perspectives, learning outcomes, and recommendations for practice. Education and Information Technologies, 27, 3037–3064.

Persico D. & Pozzi F., (2011). Task, Team and Time to structure online collaboration in learning environments. Institute for Educational Technology- Italian National Research Counsil, Palermo, Italy.

PETERSON, K. and DEAl, T. (1999). Shaping school culture: The heart of leadership. San Francisco: Jossey-Bass.

Selami, E., & Gülhanim, D., (2021). Effect of Tinkercad on Students' Computational Thinking Skills and Perceptions: A Case of Ankara Province. Turkish Online Journal of Educational Technology, 2021, 25-38.

Trilling & Fadel (2009). 21st Century Learning Skills. San Francisco, CA: John Wiley & Sons.

WALKINGTON, B. A. (1991). Strategies principals use to implement shared decision-making. (Doctoral Dissertation, University of LaVerne, 1991) Dissertation Abstract International, 296, 3151Ashared decision making. (Doctoral Dissertation, University of LaVerne, 1991) Dissertation Abstract International, 296, 3151A.

Online Resources:

Partnership for 21st Century Skills: <http://www.21stcenturyskills.org/>

<https://artutor.ihu.gr/>

<https://www.tinkercad.com/>

<https://studio.gometa.io/>

<https://quizizz.com/>

<https://genial.ly/>

<https://crosswordlabs.com/>

Learning that works for Washington, CTE. 21ST Century skills in Career and Technical Education Resource Manual. <http://www.ksd.org/programs/careerteched/Forms%20and%20Documents/21stCenturySkillsinCTEResourceManual.pdf>