

Supplementary material

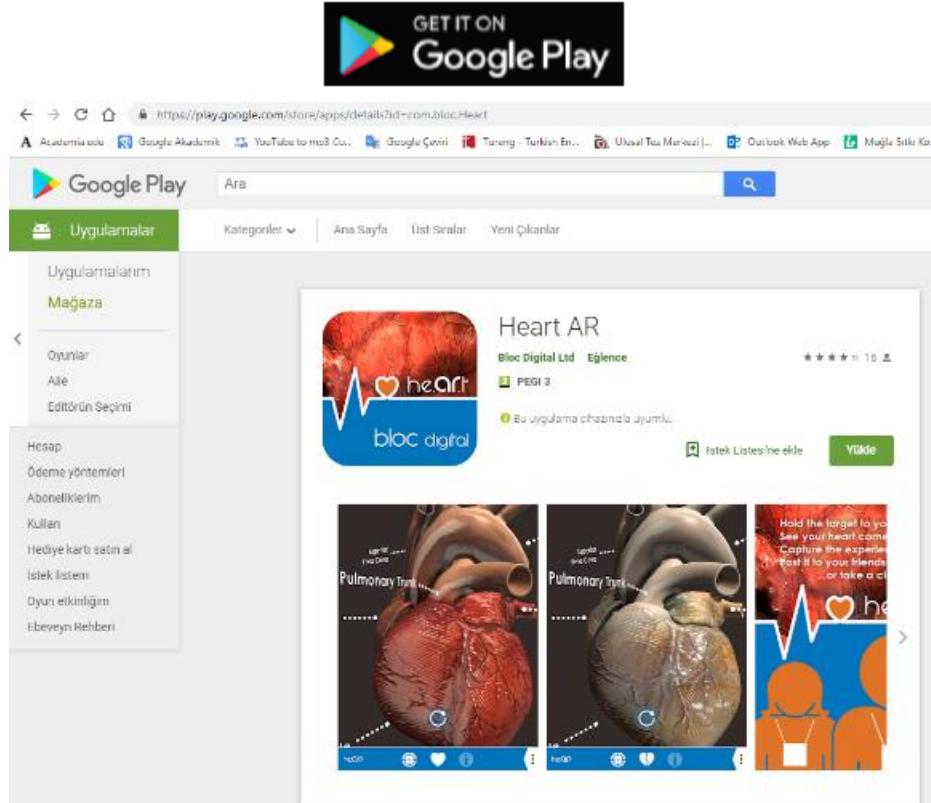
Integration of mobile augmented reality (MAR) applications into biology laboratory: Anatomic structure of the heart. *Research in Learning Technology* 28.

<http://dx.doi.org/10.25304/rlt.v28.2355>

Application. 1. Marker Paper

MARKER PAPER

- 1) The name of the MAR application differs according to the operating system of the phone. For this reason, the name of the application for the Google Play Store is "Heart AR".



- 2) The application opens after it is installed on the phone.
- 3) After opening, the program will turn on your phone's camera. The viewfinder of the camera was read by the marker prepared within the context of Biology Lab. Course and shown at the back.

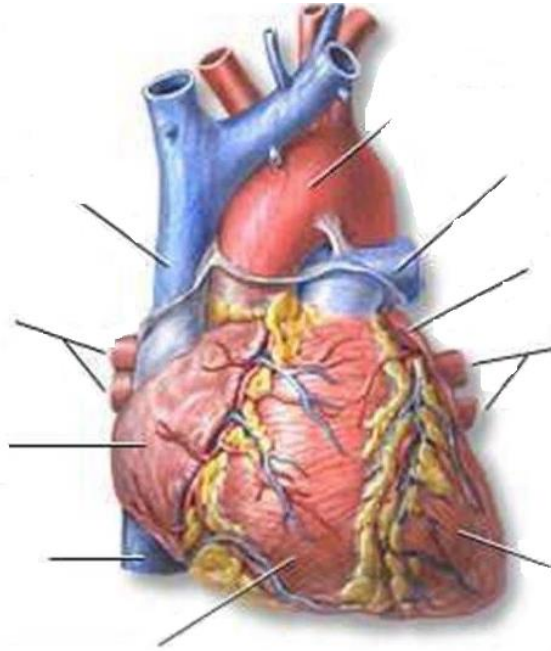
- 4) The emerging 3D model is examined in depth according to the directions given in the course.



App. 2. Worksheet: Structure of the Heart

STRUCTURE OF THE HEART

1. Please explain how the structure of the heart in MAR application?
2. Indicate the names of the heart veins in MAR application.
3. Please explain which atria and ventricles the cardiac veins in MAR application open to.
4. According to the anatomical posture of the heart in your body, how should be the direction of the heart in MAR application?
5. Do you think the heart rate varies depending on its occurrence on the left or right sides?
Why?
6. Indicate the structures of the heart given in the figure.



App.3. Instruction Manual for the Experiment

INSTRUCTION MANUAL FOR THE EXPERIMENT

1. First examine the outer appearance of the heart. You will see a crown-shaped fat layer that horizontally surrounds the heart. This layer determines the boundary between the atria and ventricles (Another layer of fat extends obliquely to the lower half of the heart. This layer determines the wall separating ventricles.).
2. Compare the thickness of the walls by opening a slit in the walls of the ventricles.
3. Then insert a glass rod through one of the slits and push the tip until it touches the inner surface of the wall. Now lift the end of the glass rod as far as it will go.
4. The membrane that prevents the rod from going further is the valve between the atrium and ventricle.

5. Split the heart and examine the ropes (beams) to which the valve is attached. Where do the other ends of the beams adhere? Note the thickness of the muscle tissue where the beams are attached.
6. Cut the aortic artery from the left ventricle lengthwise with a pair of scissors. Continue cutting until it reaches the tip of the left ventricle. This allows you to observe the structure of the valves.
7. Find the origin of the coronary artery, which is separated from the aorta just above the ventricle.
8. Then cut the atria, find the veins that come to the atria, and finally compare the structure of the heart with that of the heart shown above, and name the structures by drawing shapes.

App. 4. Worksheet: MAR and Dissection Relation-Heart

MAR and DISSECTION RELATION-HEART

1. Which methods are used to determine the right and left ventricles of the heart? Please explain.
2. Why is the left ventricle of the heart thicker than the right ventricle? Please explain.
3. What do you think is the source of the sound we hear from the heart?
4. Specify the structures shown in the cross section of the heart given below.

