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Augmented Elements



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On educatar.eu, educators can create...

Augmented Reality^(AR)

...scenes. An AR scene enhances real-world environments by blending in virtual elements when viewed through the camera of a mobile device. AR scenes can be used in MathCityMap to provide information in support of real-world objects in a motivating, playful and exciting way.

Understanding

educatar.eu allows text, images and videos to be displayed as AR elements; the use of multiple AR elements (e. g. two images and one text element) in the same AR scene is possible. Furthermore, creators have a choice between AR scenes to be triggered by GPS-coordinates (GPS-based scenes) or by a pre-defined view (marker-based scenes):

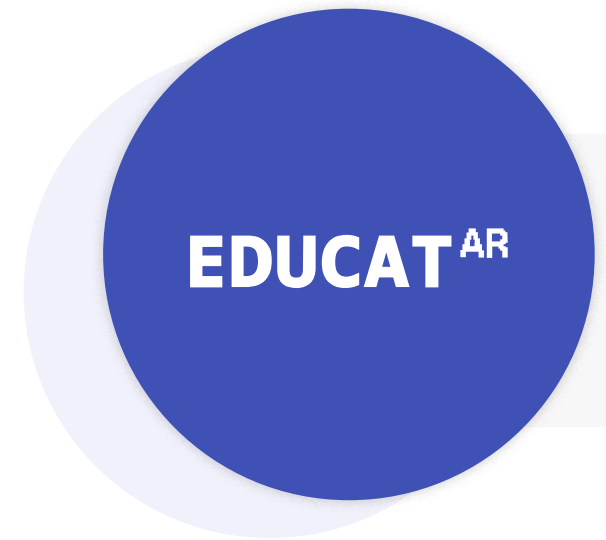
GPS-based scenes

GPS coordinates determine the location at which the AR scene is available. In order to view the AR element, one has to be in the vicinity of these coordinates and search the environment through the camera of a mobile device.

Marker-based scenes

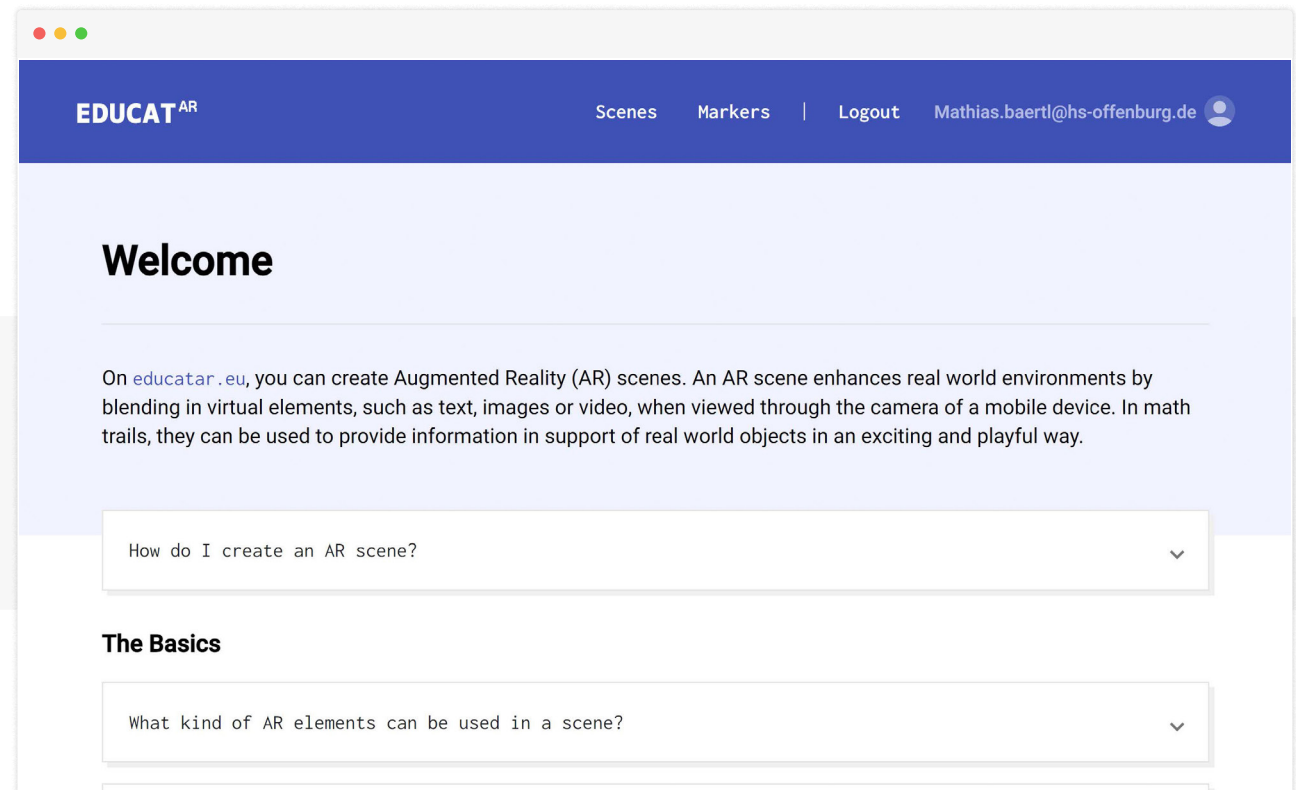
Any object (e. g. a door sign, a statue, a painting) can serve as a marker. The creator of a math trail has to provide the system with a photograph of that object. When the camera of a mobile device is directed at the object, the AR element will appear overlaid on top of it.

educatar.eu is free to use for anyone. However, registration (name, email, password, optional: city, country and institution) is required. The following pages introduce the capability and provide guidelines on how to use it. For a demo, all information contained in this document is also available in [video format!](#)



Introduction

The Welcome page offers a **brief guide** on how to use the application.



Overview

“Scenes” is the place where a creator’s AR scenes are listed. Here, one can also **create new scenes**:

Click “New scene” to open the creation page, including step by step instructions on how to proceed.

EDUCAT^{AR} Scenes Markers | Logout Mathias.baertl@hs-offenburg.de

Scenes

Create
Click on “New Scene” and follow the steps.

Search
Find a scene by using the search field and “Filter”.

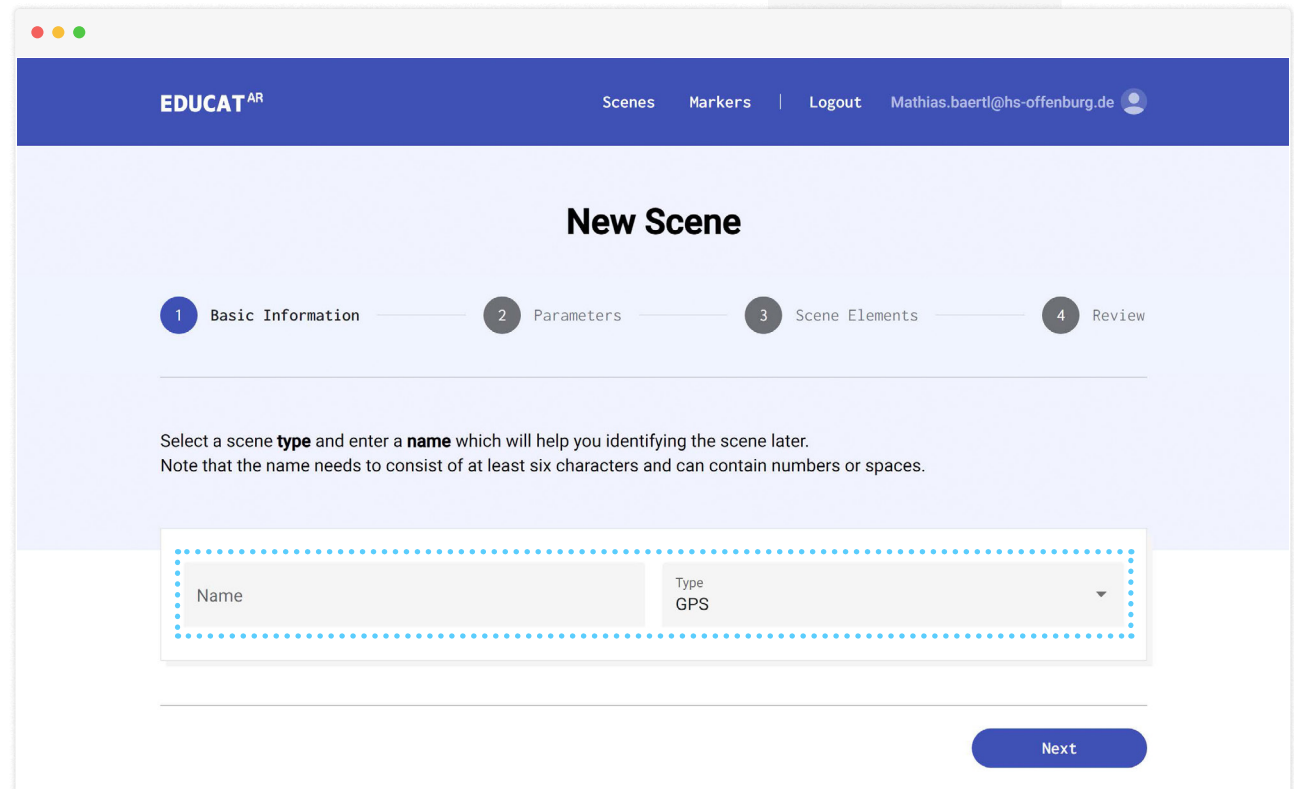
View
The Scene will be opened in a new tab or window. Copy the URL and paste it into the task (or a task’s hint) or the math trail in which you would like to use it. You can also share the URL if you want to use it for purposes other than a math trail.

New Scene Search X Filter

Name	Type	Actions
TestAufgImag	GPS (48.404000000, 8.016674750)	

Basics

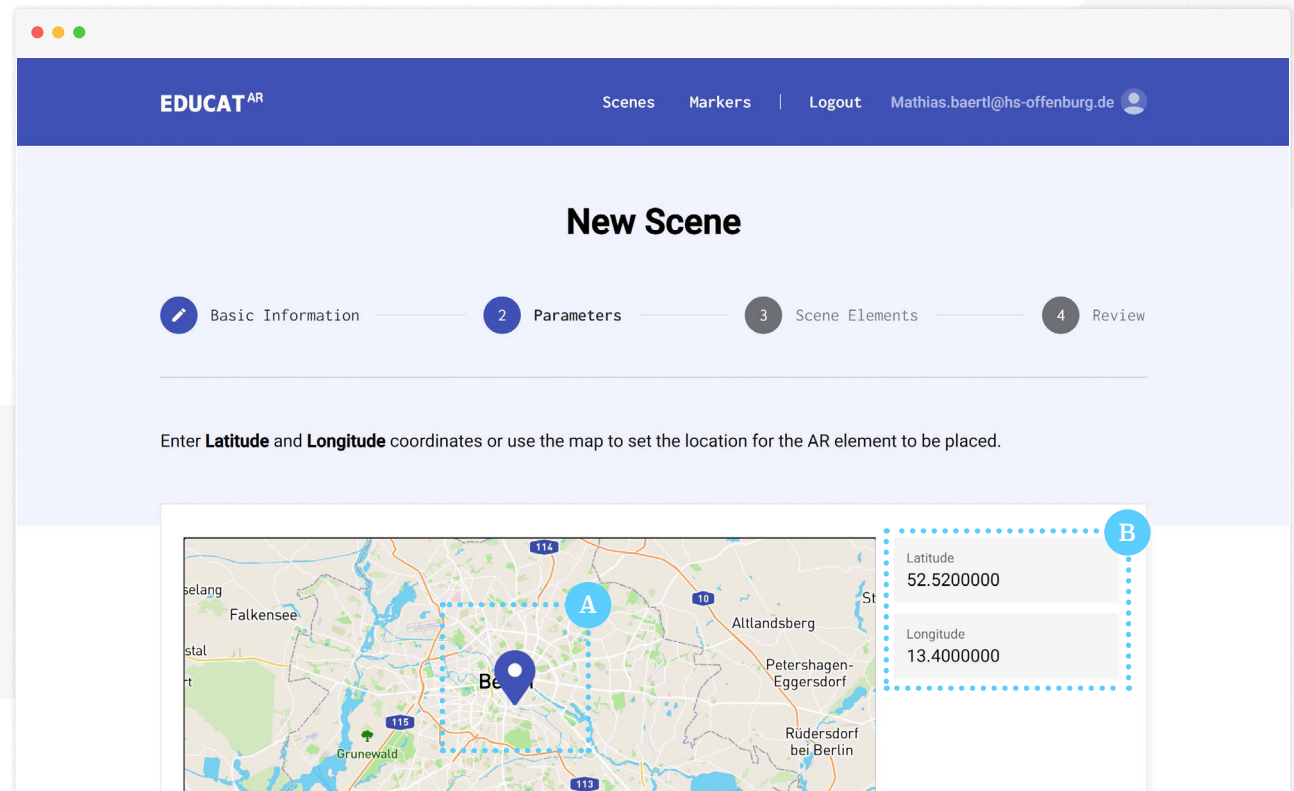
Each scene requires a name of at least six characters (letters, numbers and spaces; special characters are not permissible). Select “GPS” or “Marker” to **determine the type of AR trigger**.



The screenshot shows a web interface for creating a new scene. At the top, the header includes the logo 'EDUCAT^{AR}' and navigation links for 'Scenes', 'Markers', and 'Logout'. The user's email 'Mathias.baertl@hs-offenburg.de' is displayed next to a profile icon. The main heading is 'New Scene'. Below this is a progress indicator with four steps: '1 Basic Information', '2 Parameters', '3 Scene Elements', and '4 Review'. The first step is active. The instructions state: 'Select a scene **type** and enter a **name** which will help you identifying the scene later. Note that the name needs to consist of at least six characters and can contain numbers or spaces.' The form contains a text input field labeled 'Name' and a dropdown menu labeled 'Type' with 'GPS' selected. A blue 'Next' button is located at the bottom right of the form area.

Parameters [GPS-Based]

For GPS-based scenes, select the coordinates by clicking on the desired location on the map (zoom in or out as required) or by entering latitude and longitude values.

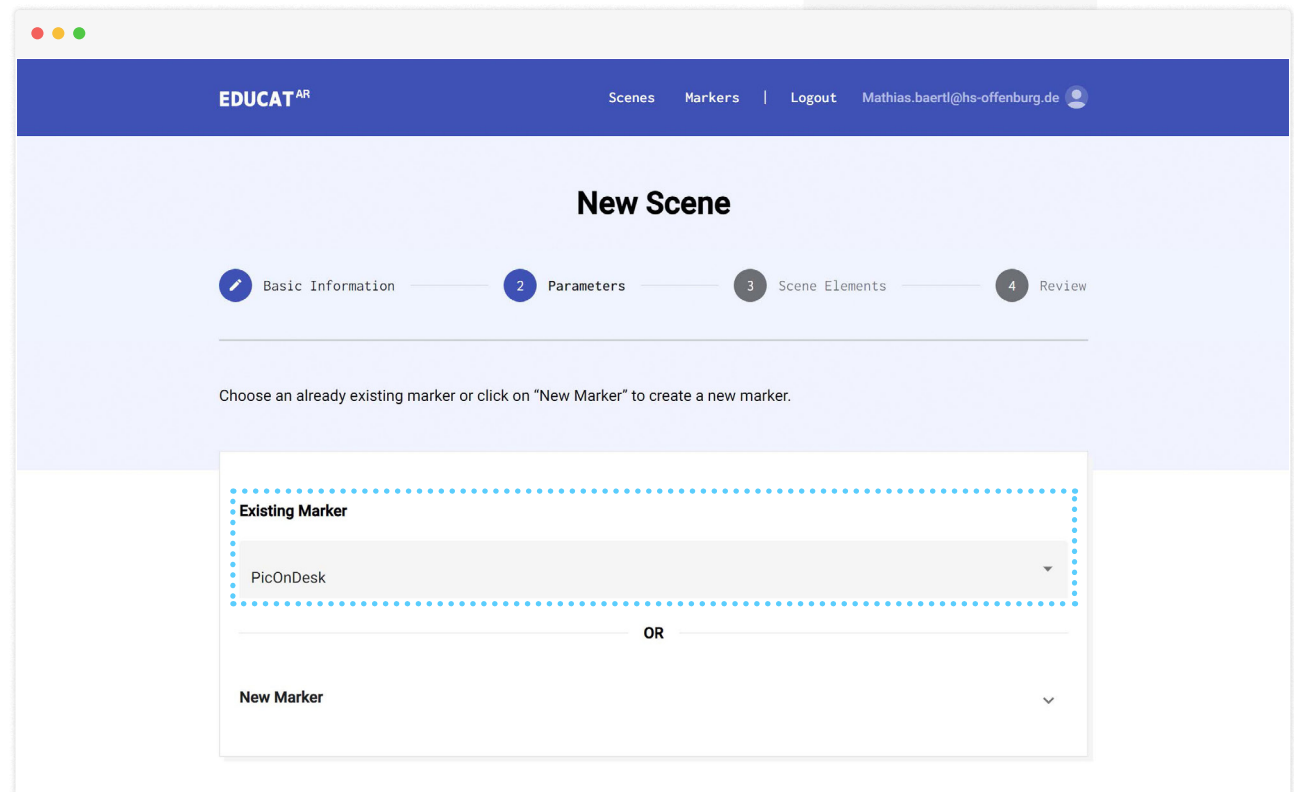


The screenshot shows the 'New Scene' interface in the EDUCAT AR application. The top navigation bar includes 'EDUCAT AR', 'Scenes', 'Markers', 'Logout', and the user email 'Mathias.baertl@hs-offenburg.de'. The main heading is 'New Scene'. Below it is a progress indicator with four steps: 1. Basic Information, 2. Parameters (active), 3. Scene Elements, and 4. Review. The 'Parameters' step is highlighted with a blue circle 'A'. Below the progress indicator, there is a text prompt: 'Enter **Latitude** and **Longitude** coordinates or use the map to set the location for the AR element to be placed.' The interface is divided into two main sections: a map and a data entry form. The map shows a location in Berlin, with a blue pin and a blue circle 'A' indicating the selected location. The data entry form, highlighted with a blue dotted border and a blue circle 'B', contains the following fields:

Latitude	52.5200000
Longitude	13.4000000

Parameters [Marker-Based]

For a marker-based scene, either select an already created marker from the list of your existing markers, or ...



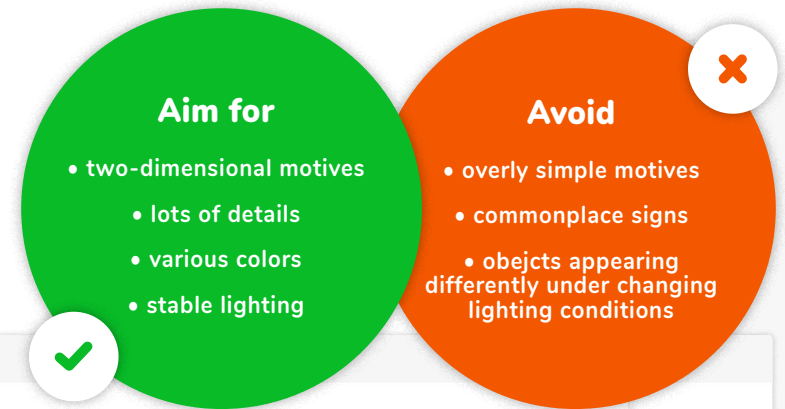
The screenshot shows a web interface for creating a new scene. The header is blue with the text 'EDUCAT^{AR}' on the left and 'Scenes Markers | Logout Mathias.baertl@hs-offenburg.de' on the right. The main content area is light blue and titled 'New Scene'. Below the title is a progress bar with four steps: '1 Basic Information', '2 Parameters' (highlighted with a blue circle), '3 Scene Elements', and '4 Review'. Below the progress bar, there is a text prompt: 'Choose an already existing marker or click on "New Marker" to create a new marker.' A white modal box is open, showing two options: 'Existing Marker' with a dropdown menu currently displaying 'PicOnDesk', and 'New Marker' with a dropdown arrow. The word 'OR' is centered between the two options.

Parameters [Marker-Based]

... create a new marker: Choose a name and upload a photograph (click the paper clip symbol) of the motif which is to serve as AR trigger.

It is recommended to scale the marker image (i. e. the photograph) down in size (e. g. 25% of its original resolution) prior to the upload to accelerate the conversion process.

“Create Marker” generates the marker. Check the “Marker Guide” to get some advice and guidelines on marker design, including examples.



The screenshot shows a web interface for creating a new marker. It features a 'New Marker' section with a list of instructions and a 'Recommendations' section. The 'New Marker' section is highlighted with a blue dashed border and a '1' in a blue circle. The 'Recommendations' section includes text about scaling images and content richness, with an information icon and a link to the 'Marker Guide'. The bottom section, highlighted with a blue dashed border and a '2' in a blue circle, contains input fields for 'Marker Name' (with the example 'EntranceDoor') and 'Image File' (with the example '20220430_154502.jpg'), a paper clip icon for uploading, and a 'Create Marker' button.

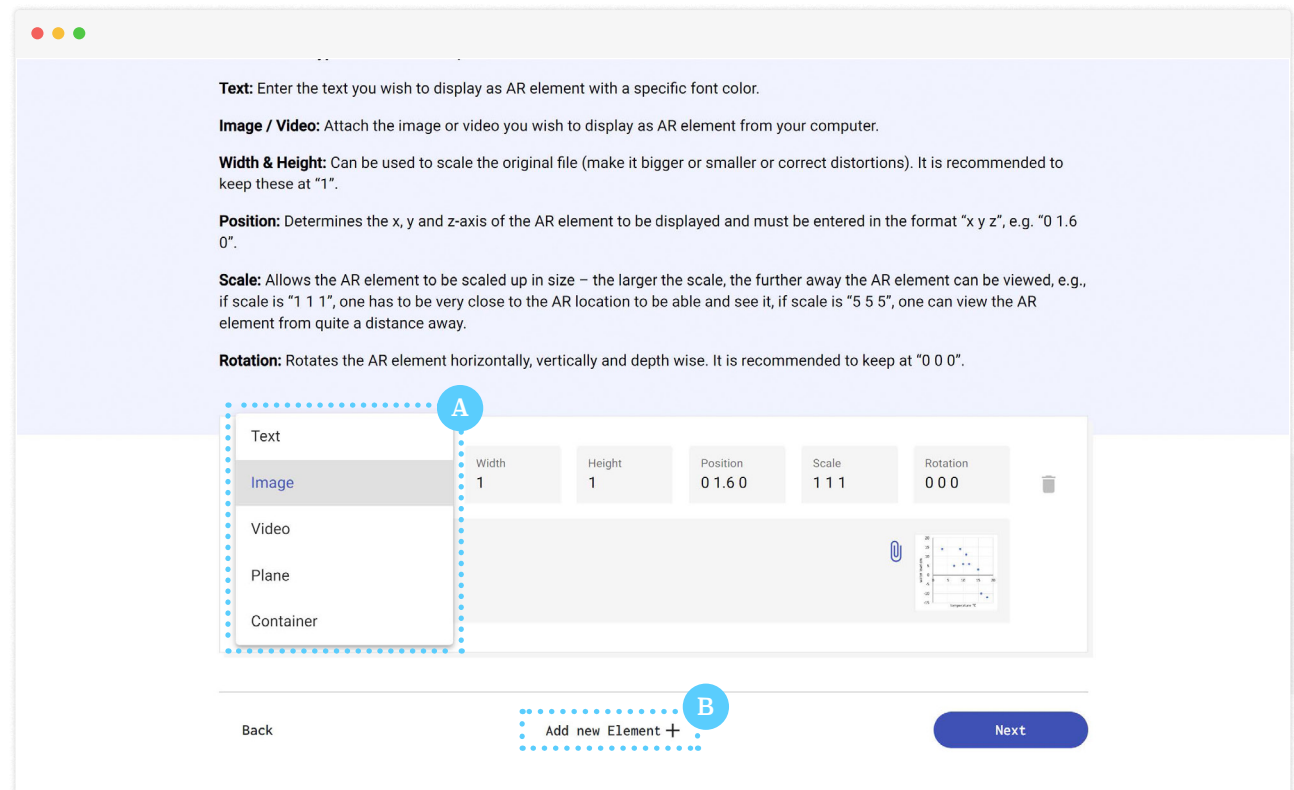
Elements

Select whether you want to show text, an image or a video as AR element (plane and container are experimental for the time being).

For text, type the desired information in the respective field and choose a font color.

For images or video, click the paperclip symbol and find and select the file on your computer.

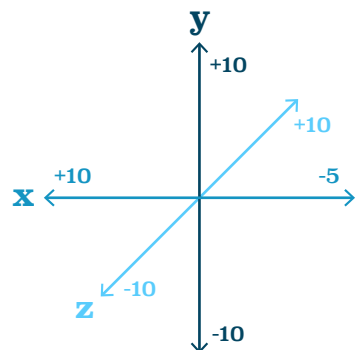
You can add more than one AR element to the same scene by clicking “Add new Element”.



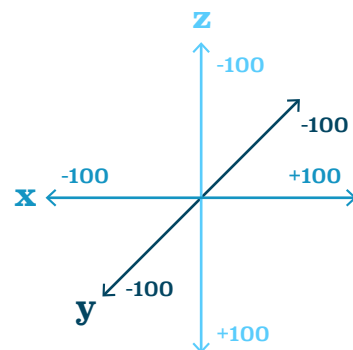
Element Settings

The appearance of AR elements can be manipulated through a range of parameters. They are in a prototype state and work differently for GPS-based and marker-based AR scenes. In some cases, they are not functional at all. educatar.eu is configured to offer, depending on the application, working default settings. It is recommended to start with the default settings and fine-tune according to the following guides:

GPS-based



Marker-based



Width and Height

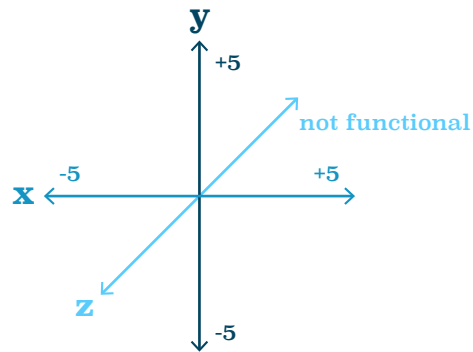
These values can be ≥ 0 and scale the size and ratio of an AR element.

Position

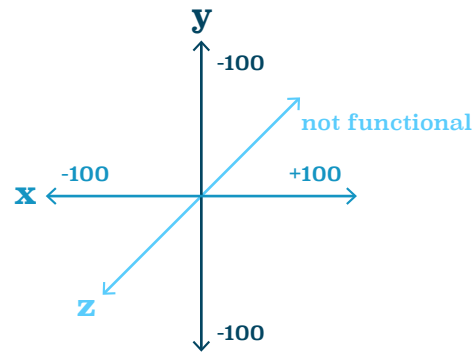
Position determines where, in relation to a viewer's camera, the AR element is displayed. It allows to move the AR element left or right, up or down and closer to or further away from the viewer.

Element Settings

GPS-based



Marker-based



Scale

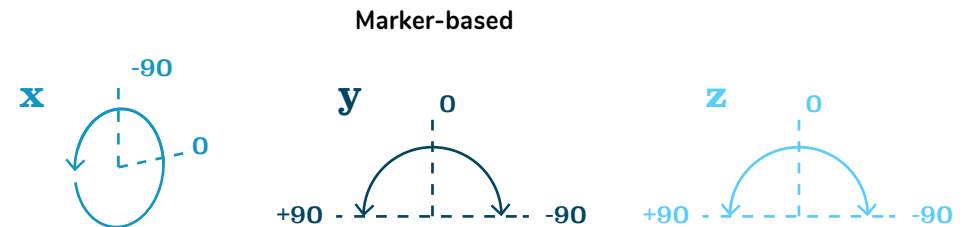
Scale allows to change the width and height of an AR element (and is, to some degree, redundant with the width and height parameters). Using a negative value will cause the object to “flip”.

The depth parameter is not functional for 2D elements.

Rotation

Rotation is **only** functional for **marker-based** AR scenes. Setting the x-value to 0 will cause the AR element to “lie flat”, making it difficult to see. A value of -90 will make it “stand upright” in front of the viewer.

The y- and z-value (redundantly) allow to rotate the AR element clockwise or counterclockwise.



Preview

The review page provides a final overview of all settings. Create the scene by clicking “Finish”. “Cancel” or return to any previous step by clicking on the respective button.

New Scene

Basic Information Parameters Scene Elements **4 Review**

This page provides a final overview of the AR scene. Please check all information entries!
Only left to finish generating the scene and place it in the list of scenes.

Scene

Name	Type	Latitude	Longitude
Test GPS	GPS	48.4675162	7.94164905

Elements

Type	Width	Height	Position	Scale	Rotation	Color	Text
Text	1	1	0 0 0	10 10 10	0 0 0	#ffc600	TEXT

Back Cancel Finish

Actions

Scenes appear on the scenes page.
Use search and filter to find scenes.

Actions

1. Copy a scene's URL to insert it into the hint of a MathCityMap task and make it part of a trail.
2. The „view“ button opens the scene in a new browser.
3. The „modify“ button allows each element of an AR scene to be changed.
4. The „bin“ button deletes the scene.

The screenshot shows the EDUCAT AR Scenes page. The header includes the EDUCAT AR logo and navigation links for Scenes, Markers, and Logout, along with the user's email Mathias.baertl@hs-offenburg.de. The main content area is titled "Scenes" and contains instructions for creating, searching, and viewing scenes. A search bar with "ResultsDemo" and a "Filter" button is highlighted with a red dashed box and a red circle labeled "A". Below the instructions is a table of scenes with columns for Name, Type, and Actions. The table contains two entries: "ResultsDemo Marker" (Marker) and "ResultsDemo GPS" (GPS). The "ResultsDemo GPS" entry is highlighted with a red dashed box and a red circle labeled "B".

Scenes

Create
Click on "New Scene" and follow the steps.

Search
Find a scene by using the search field and "Filter".

View
The Scene will be opened in a new tab or window. Copy the URL and paste it into the task (or a task's hint) or the math trail in which you would like to use it. You can also share the URL if you want to use it for purposes other than a math trail.

New Scene

ResultsDemo X Filter

Name	Type	Actions
ResultsDemo Marker	Marker	[Share] [View] [Edit] [Delete]
ResultsDemo GPS	GPS (48.395428000, 8.020575840)	[Share] [View] [Edit] [Delete]

Integration

To integrate an AR scene in a MathCityMap trail...

- 1 Copy the scene's link.
- 2 In the MathCityMap web portal, paste it into the "Position & AR" section.
- 3 In the MathCityMap app, an AR button will be displayed. Tap it to view the scene (opens browser and camera; swipe back to return).

The image illustrates the integration process between the MathCityMap web portal and the EducatAR mobile app. It is divided into three main sections:

- Top Left (Mobile App):** Shows the 'Flower Field' scene in the EducatAR app. A task is displayed: "You want to plant daffodils, but some part of the field is already used for tulips. What percentage of the field is still available? Go to the coordinates of the task, tap the AR and view your surroundings through the camera of your mobile phone to find the answer." A blue circle '3' highlights the 'AR' button in the task bar.
- Top Right (Web Portal):** Shows the 'MathCityMap Web portal' interface. In the 'Position & AR' section, a text input field contains the URL `https://educatar.eu/scene/show/343`. A blue circle '2' highlights this input field.
- Bottom (Web Portal):** Shows the 'Scenes' management interface. A table lists scenes, with 'ResultsDemo GPS' selected. A blue circle '1' highlights the 'ResultsDemo GPS' entry in the table.

IO3: Augmented Elements

 masce.eu / mathcitymap.eu/portal

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