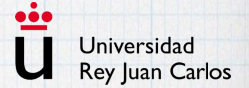


Math trails with MathCityMap and EduCITY: an experience

Álvaro Nolla (UAM), Piedad Tolmos (URJC) and Sara Martín (URJC)



The experience was carried out with pre-service teachers of mathematics Secondary Education at the Universidad Rey Juan Carlos (URJC) in Madrid, Spain, in the context of math trails. Students could learn and implement outdoor mathematics activities enhanced by mobile devices using MathCityMap and EduCITY.

The aim of the study was to compare students' experience with MathCityMap and EduCITY, both in the creation of mathematical routes and in the use of these platforms.

MathCityMap Trails

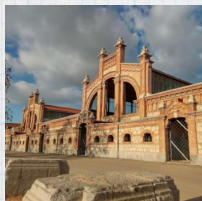
The activity consisted of two parts:

Students experienced a pre-designed math trail with MathCityMap around the URJC Campus.

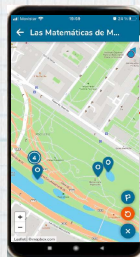


Then students were divided in groups to **create their own math trails** with MathCityMap around the city with tasks aimed for Secondary School students.

“Ruta por el Matadero de Madrid”



How many people (aprox.) fit in the Matadero square?



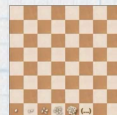
What is the height of the water tank?

GeoGebra tasks

Some of the tasks require the use of GeoGebra to be solved.

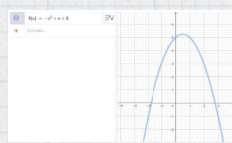


Represent with GeoGebra the function that calculates the number of grains of rice of wheat deposited in each square.



Which function represents best the water jets?

- A) $f(x) = 2x + 3$
- B) $f(x) = 2x^2 + 3x - 1$
- C) $f(x) = 20x^2 + x - 1$
- D) $f(x) = x^2 + x - 1$
- E) $f(x) = x^2 + x + 5$
- F) $f(x) = x^2 - 1$



EduCITY Math Game

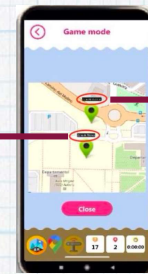
The interdisciplinary math trail took place in the Faculty of Engineering at the Fuenlabrada Campus, around an open-air museum of historic trains and planes.



Trains Zone



Airplanes Zone



Augmented markers & books



Tiene una capacidad de combustible de 90.200 L y alcanza los 5400 km.

Este Boeing707 ha realizado misiones en países como Reikjavik (3.200 km de distancia), Rey (2.954 km de distancia), entre otros.



What percentage of the fuel does the Boeing 707 consume on a mission to Reykjavik?

How many sports cars does the power of the Mikado locomotive equal?



En 1983 se fabricó esta locomotora y su nombre viene dado por la obra "Mikado" que trataba sobre un emperador japonés.

Tiene una potencia de 2000 CV y alcanza los 115 km/h.

Se trata de una locomotora de vapor y pesa alrededor de 160 toneladas.

Students were actively involved in the EduCITY game



Conclusions

- MathCityMap and EduCITY allow teachers to create contextualized educational activities with the desired curricular content with intuitive interfaces.
- The use of complementary tools such as GeoGebra enrich the mathematical outdoor activities.
- MathCityMap contains more flexibility for mathematics solutions. EduCITY adds the interactive and attractive dimension of Augmented Reality and has more capabilities to create interdisciplinary trails.



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