STEM flood project in Guadalajara.

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Project on floods in Guadalajara.

School grade: 6th Primary. (2nd Middle School) 11 to 12 years.

Project Title: How to avoid flooding in Guadalajara, Mexico.

Time: two 50 minute sessions.

Overview (General Purpose): Students will know the main causes of floods in the city of Guadalajara, Jalisco Mexico and the hydraulic principles involved in them. Then they will make an invention that helps avoid them and, if possible, take advantage of rainwater.

Vocabulary

Pluvial.

Flood.

Rain.

Precipitation.

Pluviometer.

Flow.

Sewerage.

Permeable.

Hydraulic.

Condensation.

Sewer system.

Goals:

Students will know the hydraulic principles involved in floods.

Students will explain the human and natural causes caused by flooding in the streets.

Students will make an invention that helps prevent flooding using the hydraulic principles involved in them.

Optionally the device could help to take advantage of rainwater instead of being deposited in the drain.

Material resources

Straws, glue, silicone, plastic bottles, square plastic container, scissors, adhesive tape, small stones for fish-bowl, office knife, thread, paper and colored pencils.

Multimedia resources

Videos about floods in the city of Guadalajara.

https://www.facebook.com/watch/?v=10156473228100126

https://noticieros.televisa.com/ultimas-noticias/guadalajara-lluvias-inundaciones-hoy-15-julio-colapsan/

History of Hydraulic Engineering

https://www.youtube.com/watch?v=vI5Hfl-td0Y

Video how the sewer works

https://www.youtube.com/watch?v=xY3a9TICJ78

https://www.youtube.com/watch?v=_AxjgIl21Es

https://www.youtube.com/watch?v=Ehlbls63new

Videos on how the amount of rainwater is measured

https://www.youtube.com/watch?v=RJ2w4lHSyJ0

Videos about what causes garbage in the sewer.

https://www.youtube.com/watch?v=yqxVLhevW58

Videos about Inventions for floods and garbage

https://www.youtube.com/watch?v=BrzUHUCV13I

https://www.youtube.com/watch?v=DaqoV3cRt0A

https://www.youtube.com/watch?v=ac8oz1lr7Vo

https://www.youtube.com/watch?v=6OyTI7yyaM4

https://www.youtube.com/watch?v=p_cIFD0Ek5I

Online text resources.

What is hydraulic engineering?

https://conceptodefinicion.de/ingenieria-hidraulica/

Texts on how sewage works.

https://www.cubaseltiopaco.com/para-que-sirve-la-red-de-alcantarillado-y-su-limpie/

https://es.wikipedia.org/wiki/Alcantarillado

Texts about garbage in the sewer.

http://wradio.com.mx/emisora/2018/09/12/guadalajara/1536706629_280899.html

https://www.notisistema.com/noticias/alcantarillas-con-basura-causa-principal-de-inundaciones-en-zapopan/

http://wradio.com.mx/emisora/2019/05/31/guadalajara/1559258049_457000.html

Texts on measurement and amount of rainfall

https://instrumentosdemedicion.org/medir/la-lluvia-que-cae/

https://water.usgs.gov/gotita/earthrain.html

Inventions for floods

https://www.eldefinido.cl/actualidad/lideres/3073/Nino_de_11_anos_invento_la_gran_solucion_para_las_inundaciones/

https://news.culturacolectiva.com/noticias/inventos-contra-lluvias-ciudad-de-mexico/

http://www.cienciamx.com/index.php/tecnologia/biotecnologia/15906-tecnologias-bajo-impacto-inundaciones-lluvias

Multimedia resources optional.

Video on the use of rainwater

https://www.youtube.com/watch?v=vpGZpvXM9z8

Basic previous information before the lesson

Students will comment on the floods that have currently affected certain areas of the city: damage to people, homes, cars, commercial establishments, public roads, etc.

Lesson Development

FIRST SESSION.

First part: 20 minutes.

Students will study how the amount of rain is measured and calculate how many millimeters of rain have fallen in certain areas of the city when the water reaches levels of 50 cm, 70 cm and one meter.

Second part: 30 minutes.

Students will design the plan of an invention that avoids flooding in the city by applying the mathematics and principles of hydraulic engineering. They will explain how their invention works to the other classmates and the teacher and how they performed the calculations that justify its operation.

SECOND SESSION

First part: 40 minutes.

Students will develop their invention based on what they presented about their design the previous session.

They will take care of the order of the materials, their proper use and leave their work area in order once they have finished.

Second part: 10 minutes.

Students will explain how they made their invention and demonstrate it to their classmates and teachers.

They will also explain the difficulties they encountered in the construction process and how they were solved.