Design Across the Borders

Assoc. Prof. Aktan Acar, PhD

TOBB University of Economics and Technology
Department of Architecture

Design across the borders of

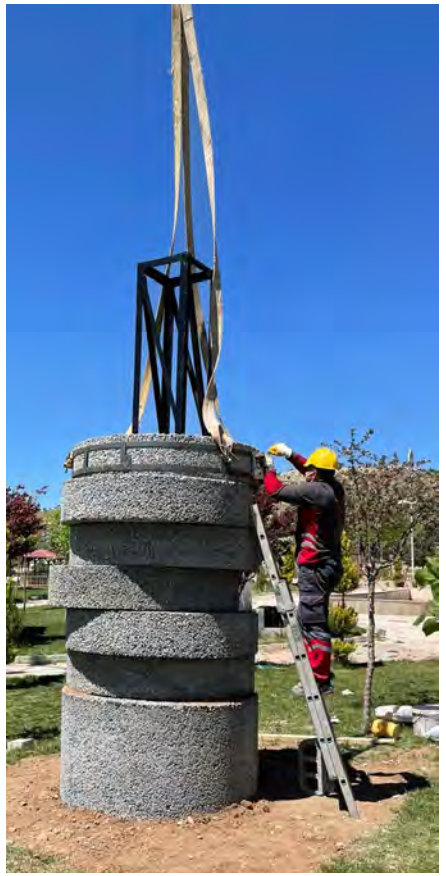
communities
education
generations
disciplines
technologies
methods
tools

Experiments in Graduate Courses

Workshops / 3rd and 4th Grades collaborating with First-Year Architecture Students

Experiential Learning in the First-Year Program

Practice



Trans-discipliner Material Research and Experiments



Experiments in Graduate Courses

2019 Summer Semestre / Interaction – Intersection - Communication


Organic reinforcement

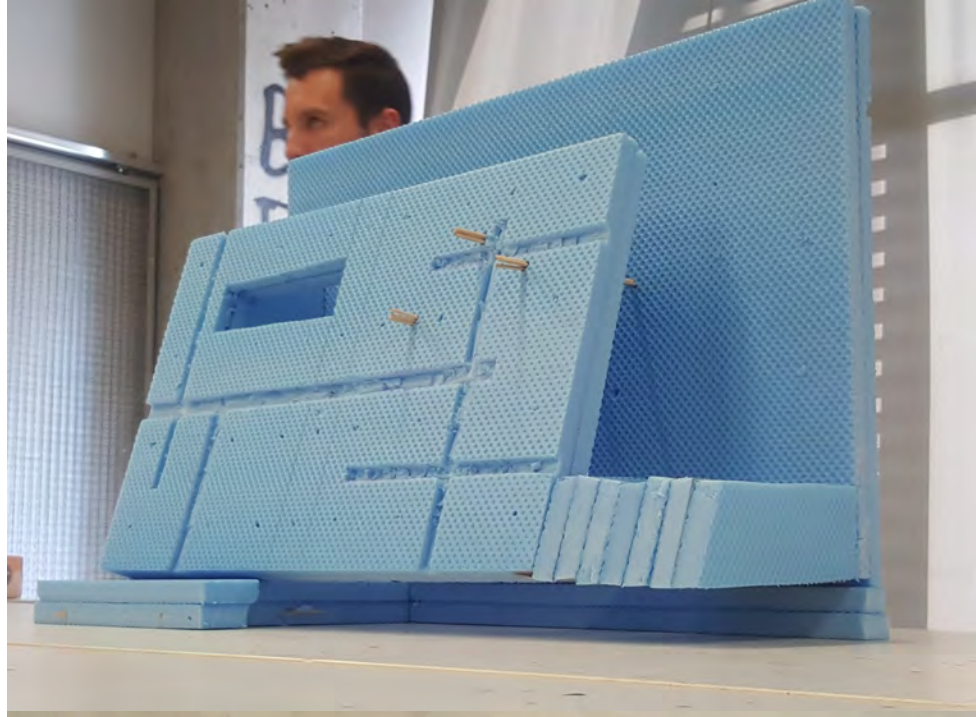

topsoiling


Reservations for roots
and branches


Porous concrete


A living and
interacting GABION is
possible
gettyimages
Hola Images

BETONART 2019 Workshop end product: Porous Concrete «Home»
Moderator: Aktan Acar
Participants: Aysu Kuştaş, Aysu Haşimoğlu, Bingül Çakacı, Ala Taleb, Melih Karataş, and Sercan Deniz



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Bauhaus
100
yaşında
STANdartlaşTIRma
Walter Gropius
BETONART
MİMARLIK YAZ OKULU' 19
27 TEMMUZ - 5 AĞUSTOS 2019
TOBB ETÜ/ ANKARA
TÇMB
TOBB ETÜ
BETONART
MİMARİST



Workshops /
3rd and 4th Grades collaborating with First-Year Architecture Students

2016-2017 Fall Semestre Basic Design Studio
Workshop with Primary School Kids
«Ecosystem»

2017-2018 Fall Semestre Basic Design Studio
Workshop with Primary School Kids
«Ecosystem»

2018-2019 Fall Semestre Basic Design Studio Workshop with Primary School Kids «Design & Build»

2019-2020 Fall Semestre Basic Design Studio
Workshop with Primary School Kids
«Home for Pollinators»

2019-2020 Fall Semestre Basic Design Studio
Workshop with Primary School Kids
«Home for Pollinators»

2019-2020 Fall Semestre Basic Design Studio
Workshop with Primary School Kids
«Home for Pollinators»







2022-2023 Fall Semestre Basic Design Studio
Workshop with Primary School Kids
«Home for Bugs»

2022-2023 Fall Semestre Basic Design Studio
Workshop with Primary School Kids
«Home for Bugs»

2019 Competition Project (3rd Prize)
Aktan Acar / Yıldırım Yazganarıkan

Cement Industry Employers' Association (ÇEİS)
«Design Competition 2019)

An experiment: First green tower

Second Experiment in Mardin.
Taller, Wider, Greener.


MOSS (Bryophyta)

A Transdisciplinary Project:

“Development of Waste Plastic-Based Capsules for Plant Seeds to be Placed in Permeable Concrete Materials”.

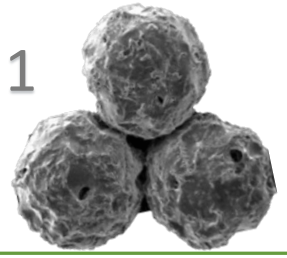
Department of Material Science and Nanotechnology Engineering.
MBN 497 Senior Design Project course
Students:
İsmail ÖZTAŞ, Cem AŞÇI, Öznur TİFTİK

Advisor: Assoc. Prof. Hatice Duran
Co-advisor: Assist. Prof. Aktan Acar

Literature Review

Microfluidics

1

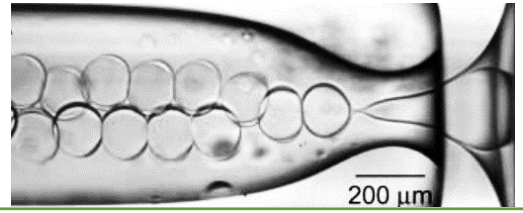


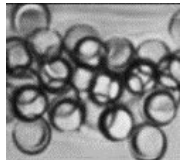
Quevedo et al. (2005)

- ✓ Interfacial Polymerization
- ✓ Organic: sebacoyl and trimesoyl chloride mixture
  Aqueous: polyethyleneimine (PEI)
- ✓ Oil filled polyamide capsules

[9]

2



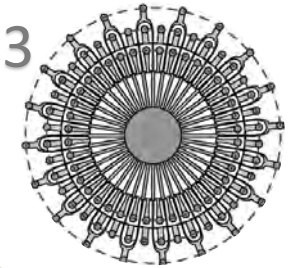


Utada et al. (2005)

- ✓ Double emulsions followed by photo-polymerization
- ✓ Microcapsules

[10]

3



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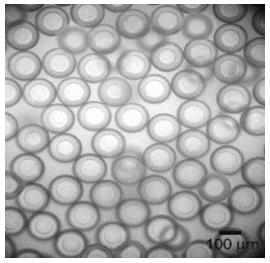


Nisisako et al. (2012)

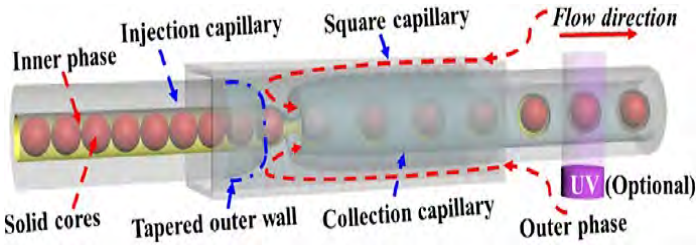
- ✓ Circularly arrangement of various microfluidic droplet generators
- ✓ Single emulsion, double emulsions and triple emulsions

[11]

Gao et al. (2019)

- ✓ Polystyrene solid cores with 450-micron diameters
- ✓ Some differences from former devices

5



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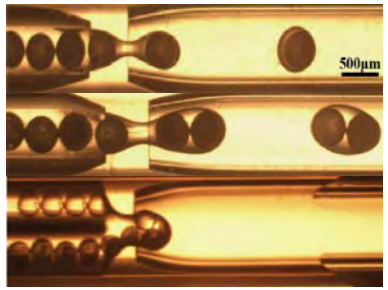


[12]

Self-Assembly

Lee et al. (2006)

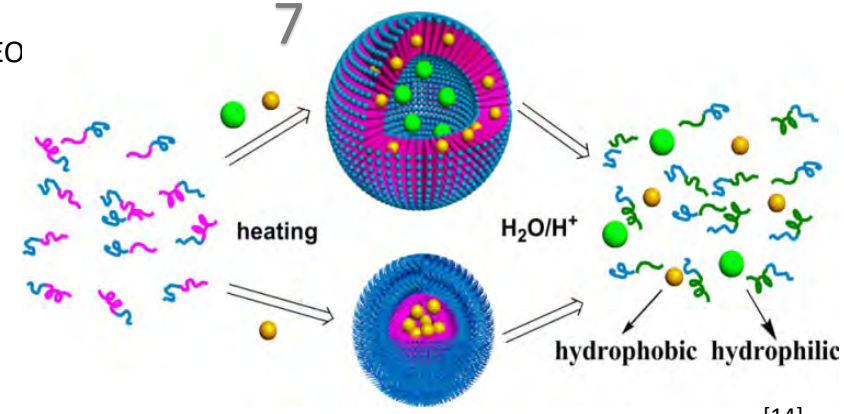
- ✓ Solvent displacement
- ✓ Graft copolymer → spherical micelle and vesicles in aqueous solution
- ✓ Aim → to show the capability of graft copolymers for being used as delivery carriers

[13]

Qiao et al. (2013)

- ✓ Thermoresponsive PEO b-PtNEA block copolymers
- ✓ Heating to 37 °C → self-assemble
- ✓ Dissociation under acidic conditions
- ✓ Drug delivery

7

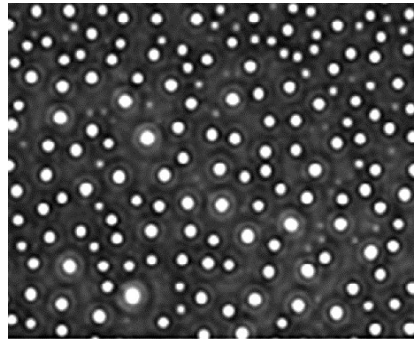


[14]

Chatterjee et al. (2017)

- ✓ Polymer rehydration
- ✓ Encapsulation of rhodamine B dye with dewetting method using PLGA
- ✓ 0.2% PLGA dissolved in acetone → glass surface → extraction into water
- ✓ Microcapsules in 1.0–3.0 µm range and nanocapsules in 50–100 nm range

8



[15]

[9] Quevedo et al. Interfacial polymerization within a simplified microfluidic device: capturing capsules. Journal of the American Chemical Society, 127(30), 10498-10499.

[10] Utada et al. Monodisperse double emulsions generated from a microcapillary device. Science, 308(5721), 537-541.

[11] Nisisako et al. High-volume production of single and compound emulsions in a microfluidic parallelization arrangement coupled with coaxial annular world-to-chip interfaces. Lab on a Chip, 12(18), 3426-3435.

[12] Gao et al. Microencapsulation of solid cores to prepare double emulsion droplets by microfluidics. International Journal of Heat and Mass Transfer, 135, 158-163.

[13] Lee et al. Biodegradable polymersomes from poly (2-hydroxyethyl aspartamide) grafted with lactic acid oligomers in aqueous solution. Macromolecules, 39(15), 4938-4940.

[14] Qiao et al. Polymersomes from dual responsive block copolymers: Drug encapsulation by heating and acid-triggered release. Biomacromolecules, 14(5), 1555-1563.

[15] Chatterjee et al. A novel approach to fabricate dye-encapsulated polymeric micro-and nanoparticles by thin film dewetting technique. Journal of colloid and interface science, 506, 126-134.

Literature Review

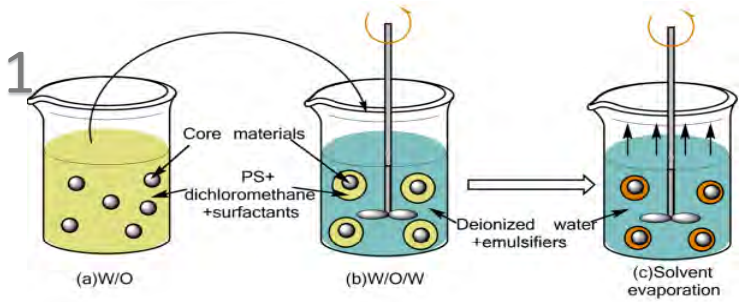
Solvent Evaporation

Hu et al. (2020)

- ✓ DMP-30 ((tris (dimethylaminomethyl) phenol)) core material
- ✓ W / O / W binary system
- ✓ Polystyrene Wall material
- ✓ Emulsifier: Sodium dodecyl sulfate and Arabic gum

2

1

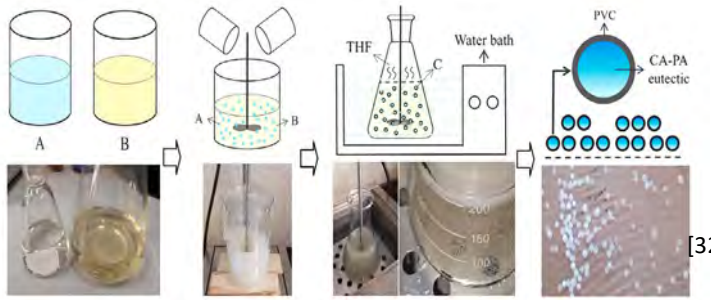


[31]

Xing et al. (2021)

- ✓ Microencapsulation of eutectic fatty acids (capric acid-palmitic acid)
- ✓ PVC shell materials
- ✓ Tetrahydrofuran (THF) organic volatile solvent
- ✓ NaCl added to make THF immiscible with water
- ✓ Gelatin emulsifier.

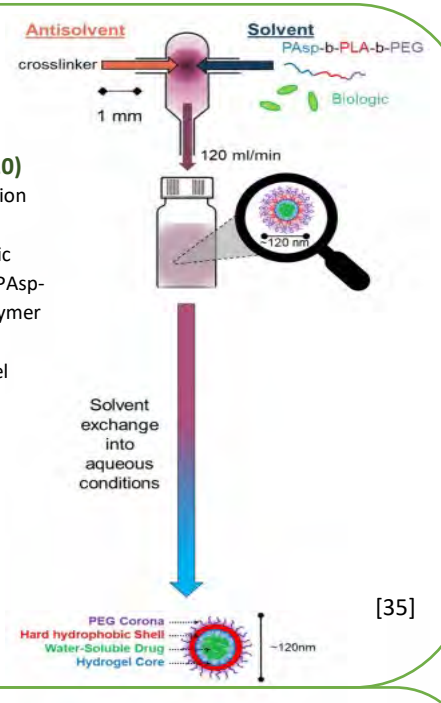
3



[32]

Nanoprecipitation

7

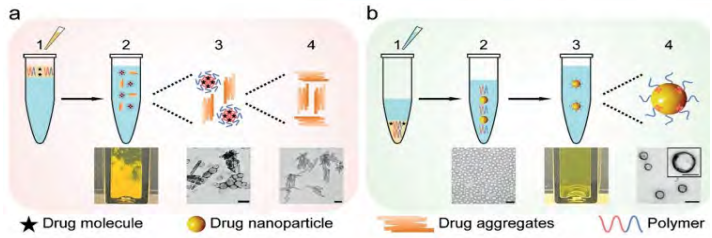


Markwalter. et al. (2020)

- ✓ Inverse flash nanoprecipitation method
- ✓ Poly(aspartic acid)-poly(lactic acid) - Polyethylene glycol (PAsp-b-PLA-b-PEG) triblock copolymer
- ✓ Water-soluble drugs in core region consisting of hydrogel
- ✓ PLA : a hydrophobic shell
- ✓ PEG : outside the shell

[35]

8



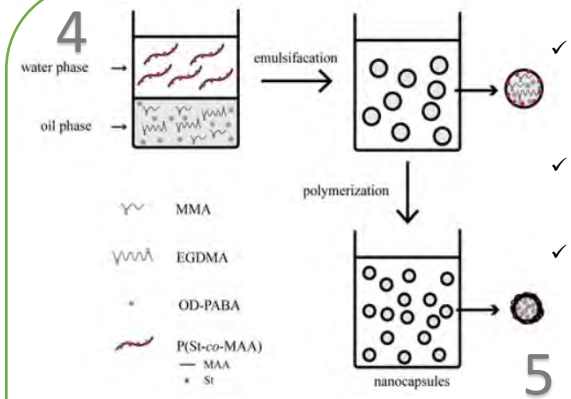
Liu et al. (2020)

- ✓ Sequential nanoprecipitation
- ✓ Polyethylene glycol-Poly Lactic-co-Glycolic Acid (PEG-PLGA) diblok polymer
- ✓ DMSO(Dimethyl sulfoxide) / DMF (Dimethylformamide) / EtOH

[36]

Mini Emulsion Polymerization

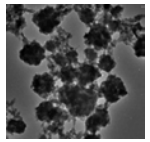
4



An et al. (2020)

- ✓ Octyl dimethyl para-aminobenzoic acid (OD-PABA) organic UV absorber
- ✓ Oil phase: MMA, OD-PABA , AIBN and EGDMA
- ✓ Aqueous phase: P(St-co-MMA)

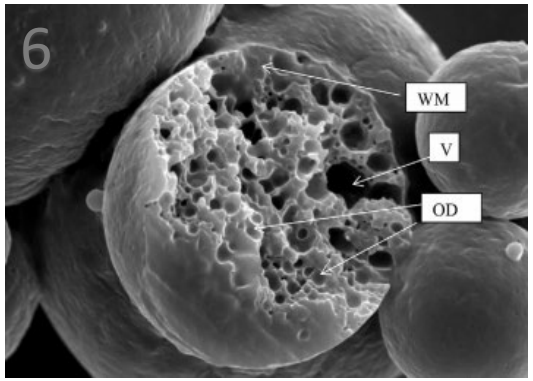
5



[33]

Supercritical Fluids Based Methods

6



Lee et al. (2018)

- ✓ Red palm oil microcapsules
- ✓ Soy lecitin
- ✓ 50 °C, 125 bar
- ✓ OD(oil droplet), V(void), and WM(Wall material)

[34]

[31] Hu et al. Microencapsulation of tris (dimethylaminomethyl) phenol using polystyrene shell for self-healing materials. Scientific Reports, 10(1), 1-14.

[32] Xing et al. Microencapsulation of fatty acid eutectic with polyvinyl chloride shell used for thermal energy storage. Journal of Energy Storage, 34, 101998

[33] An et al. Preparation and evaluation of polymer-encapsulated UV filter nanocapsules with miniemulsion polymerization. Journal of Dispersion Science and Technology, 1-8.

[34] Lee et al. Microencapsulation of red palm oil as an oil-in-water emulsion with supercritical carbon dioxide solution-enhanced dispersion. Journal of Food Engineering, 222, 100-109.

[35] Markwalter et al. Polymeric Nanocarrier Formulations of Biologics Using Inverse Flash NanoPrecipitation. The AAPS journal, 22(2), 1-16.]

[36]Liu et al. 2020. Stable polymer nanoparticles with exceptionally high drug loading by sequential nanoprecipitation. Angewandte Chemie, 132(12), 4750-4758.

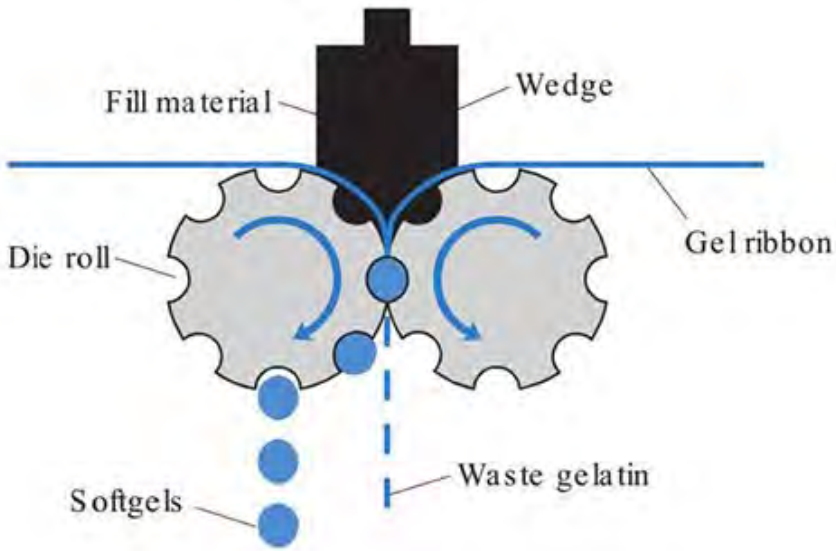
1) Gelatine Tank
Phase inversion substances: Polypropylene (PP), water and organic solvent capsule in the form of gelatine
Combination of soft gelation capsule production and hard capsule production

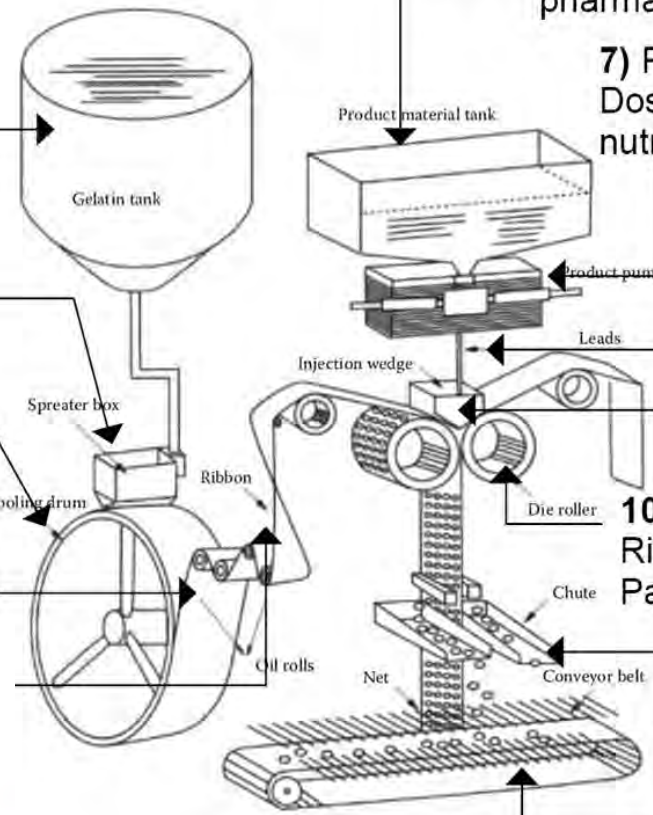
2) Spreader Box
Formed porous PP spread to cooling drum

3) Cooling Drum
Decrease the temperature of PP

4) Oil Rolls
Usage of oil (lubricant) to prevent stacking

5) Ribbon
Sheet form of PP





6) Fill Material
Seed nutirent liquid instead of pharmaceutical fill

7) Pump
Dosage regulation of seed nutrient liquid

8) Lead Modification
Multi-lead design to prevent stacking of hard seeds and to provide direct injection to die roller

9) Injection Wedge
PP ribbon transfer to die roller

10) Die Roller
Ribbon fed into die pockets
Parallelly, injection of the seed

11) Chute
Capsules leading to the conveyor belt

12) Conveyor Belt
Transport of the capsules to be packaged

A NEW HOPE
BIOPLASTIC CAPSULES FOR SEEDS

Belfu Berkol,

Promising researcher.

Student of

Saint Joseph High School

A NEW HOPE
BIODEGRADABLE BIOPLASTIC CAPSULES FOR SEEDS

A NEW HOPE
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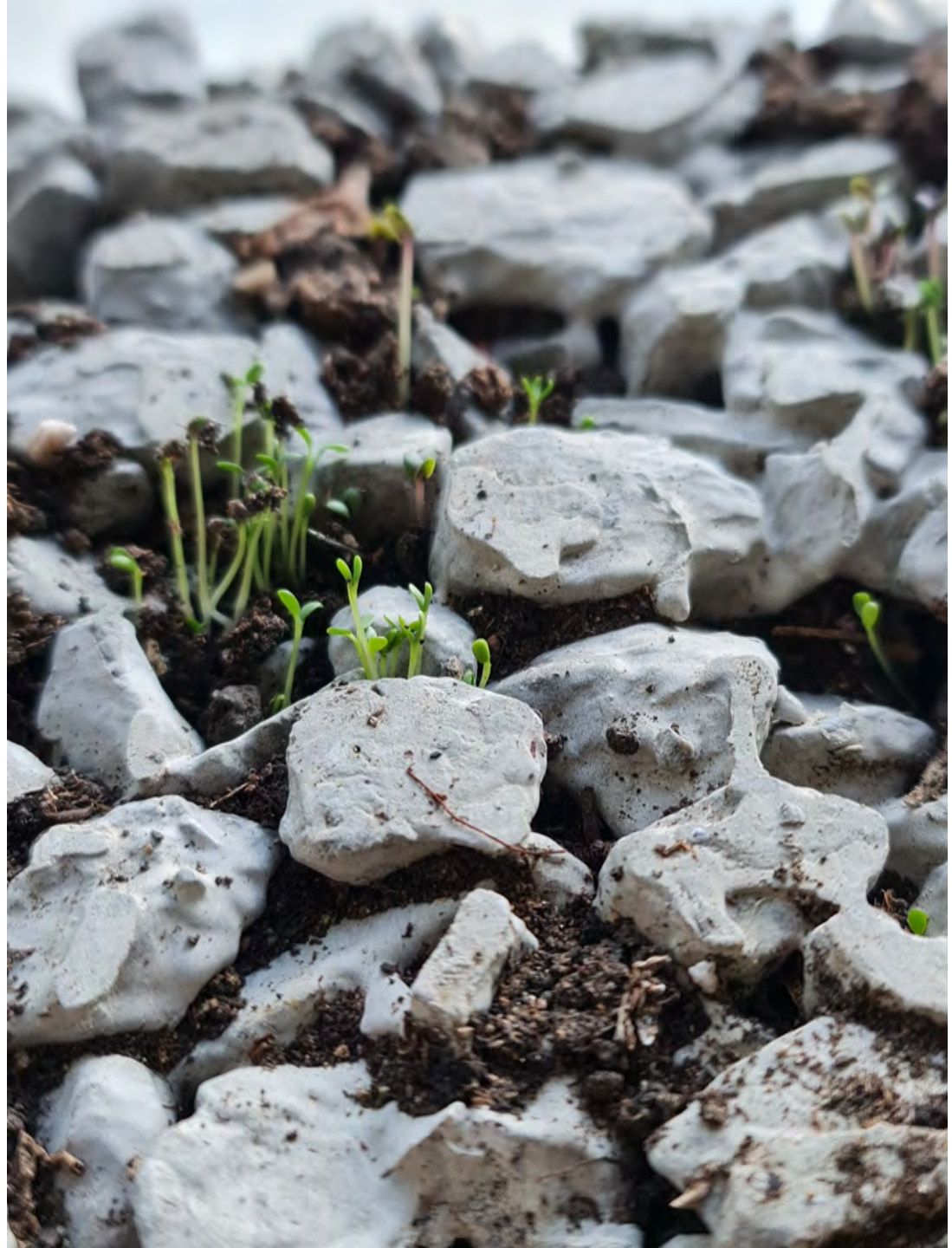


Learning by Playing
MINECRAFT EDUCATION EDITION

HAKAN DEĞERTEKİN
OĞUL İŞİNER
SİMAY DEMİR
ZEYNEP ERGÜNEY
BARTU ÖZTÜRK
DOĞA DEMİRÖREN
SELAHATTİN NACAR
EZGİ AYTEN KALUK
MURAT APAYDIN
YUSUF BORA TÜMEN
TİBET TOPÇU
BEYZA SOLMAZ

2020-2021 Summer Semestre / Elective Course

Minecraft Education Edition for «Climate Change»

Learning by Playing
MINECRAFT EDUCATION EDITION

LEVEL	SKILLS AIMED TO BE TAUGHT	TARGETED RESULT THANKS TO ACQUIRED SKILL	EXERCISES IN THE GAME	CHARACTERS
1	Communicating Using Information Technologies, Accessing Information - Sharing and Self-Expression	-Learn coding and programming, use logic, make decisions, develop critical thinking and problem solving skills -Learning the concepts and basic principles of computer science, developing themselves in digital media, information technology and computer science	-Basically, in the process, students can use different resources (videos, Google Earth, etc.) games/ puzzles, etc. that will be provided and allow you to use the information obtained here in the game, will be.	
2	Problem Solving, Planned Work and Original Product Development	-To be aware of the subject or problem, to identify and explain the subject or problem, to analyze and interpret the subject or problem, to make predictions and decisions about the future, to make assessments and to make judgments by making personal inferences and to make judgments	-We aim to gain competencies such as analyzing and interpreting a problem with steps such as puzzle that will be in the game. -We anticipate that the answer to the puzzle asked in the game may be a fiction that they can find by watching the directed video, and thus the control of whether the videos are being watched will also be made.	
3	Research, Information Configuration, Collaborative Work	-Development of concepts such as feature discovery, comparison, co-thinking, synthesizing, association -Identify, analyze, and implement optimal solutions or solutions by using resources effectively and effectively -Students' mastery of basic concepts in sustainability/ climate issues in their first and second languages	-We aim to play the game in groups and make certain task distributions within each group. -As these task distributions change every week,we aim to develop different perspectives in the face of the new problem. -We aim not only to be fiction based on consumption, but also fiction that encourages or in some cases requires the use of alternative methods such as "barter" (for example, Especially resources that are difficult to recycle/ produce can only be reached by clearing method at a certain stage, English Turkish and English) to master the basic concepts of test or puzzles to take part in the game.	
4	Geography Information	-Gaining geographical skills within the framework of human-nature relationship -Understanding the functioning and change of natural and human systems -Time perception of geological processes: time perception of annual, seasonal and daily processes	- Providing students with access to programs such as Google Earth in the game. - Students gain knowledge by performing nature walks accompanied by their teachers (different landforms, trees. etc.by those who create the game. design)	
5	Global Environmental Problems, Ecological Footprint, Substance Cycle and Natural Balance	-Gaining a sense of responsibility for the functioning of the ecosystem -Understanding the importance of spatial planning for the harmonious union and continuity of nature and man -Developing "savings awareness" in the use of natural and human resources	- Include tasks that must be completed to cope with extreme weather events and their consequences (such as reorganizing agricultural areas after a possible disaster).	
6	Initiative and Entrepreneurship	-The possibility of reaching full capacity -Gaining a sense of self-confidence and self-control acquisition -Gain leadership and team experience -Don't realize what you can do about the climate crisis; "I can do something and be part of that solution."	-For a better internalization process and sense of responsibility, students can use examples close to their age groups in the game. (for example, Greta Thunberg) we aim to have video examples that tell you what they do/ do on the subject.	
7	Multitasking Awareness	-Development of planning and organizational ability, -Gaining stress management	-In the context of "gender equality", when distributing tasks, we ensure that the number of girls and boys is balanced for this task or consciously distributed in a way that may contradict gender roles in traditional societies (for example, Boys are involved in the process of preparing food, and girls are involved in the process of cutting trees and producing materials).	
8	Critical Thinking and Alternative Strategy Development	-Observational ability; pay attention to events and facts, detect events and facts, identify incidents and facts, explain the causes and consequences of events and phenomena, question the causes and consequences of events and observations, and establish relationships between events and facts	-The game aims to use human and non-human animal characters and provide communication with them (example, One of the tasks is to ask students to write down their experiences and feelings from the mouth of an animal affected by the climate crisis-this is done by directing it to a forum outside the game -)	
9	Acquiring Motor Skills	-Development of hand-eye-mind coordination -Increase in concentration	- Hand eye coordination to players with the help of keys, arms and light is predicted to increase in concentration as a result of developing puzzles and increasing speed with the help of redstone tools. -Because hand-eye coordination is provided via the keyboard and mouse, parts that require fast typing and sharper mouse use can be added to these games.	
10	Social Psychology	-Realizing that each individual in the group has their own thoughts and ways of life, and when it comes to humanizing the characters in the game, it is time to realize that there is a person behind the other players in the group.	- It is planned to create a social space in the world, and interagency players will gather and socialize in this area. - If survival mode is active, it is planned that players ' cooperation among themselves will occur through decks that they use as partners in these social areas or areas specific to their groups.	
11	Multidimensional Thinking, Gaining Perspective and Field Perception	-Understanding the relationship, distance and changes of objects on the axis of spaces and planes	-In Game fiction, we aim to enable students to experience space differences in the light of their own imagination and to acquire concepts such as height, natural-artificial light, surface materials, depth, indoor and outdoor perception.	
12	Comprehending and Planning Time	-Perception of change and continuity; to find similarities and differences in time and process, to perceive change and continuity in space	- With the help of Redstone tools, the concept of time can be incorporated into almost every episode the player encounters. During thinking about the accuracy of decisions taken against time, it is aimed to plan the thought fiction in the player's mind according to time.	

2020-2021 Summer Semestre

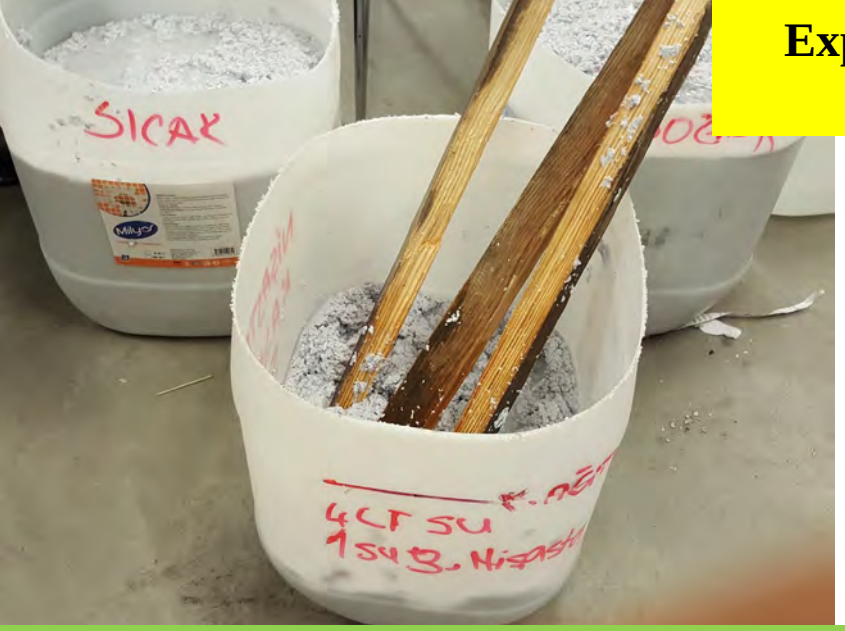
Graduate Course

A Rubric for Climate Change in Minecraft Education Edition

Researchers:

Tuğçe Gürsel
Göknur Sena Uygur
Cansu Kaya
Yiğit Beyler

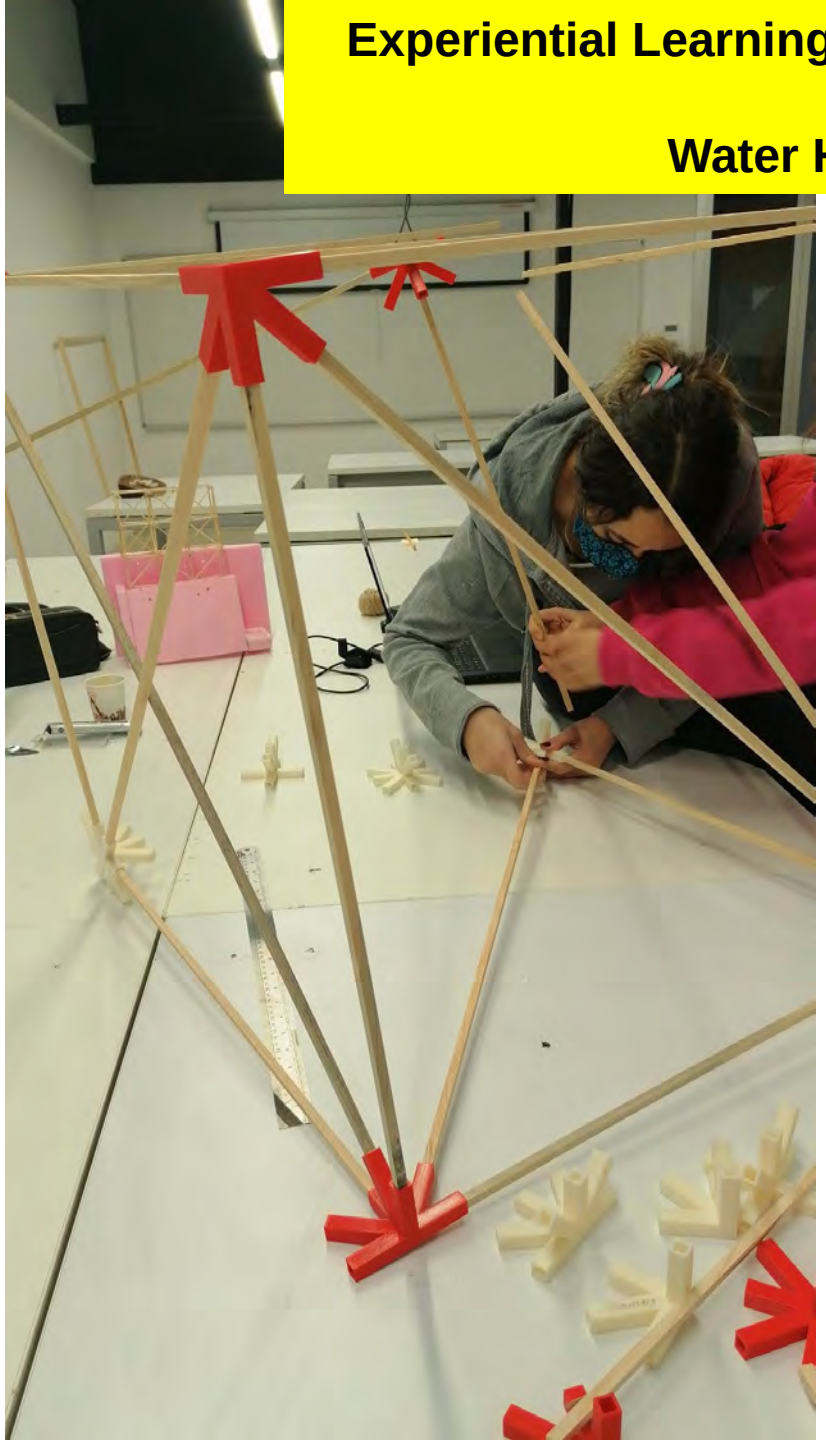
Experiential Learning in the Undergrad First-year Program

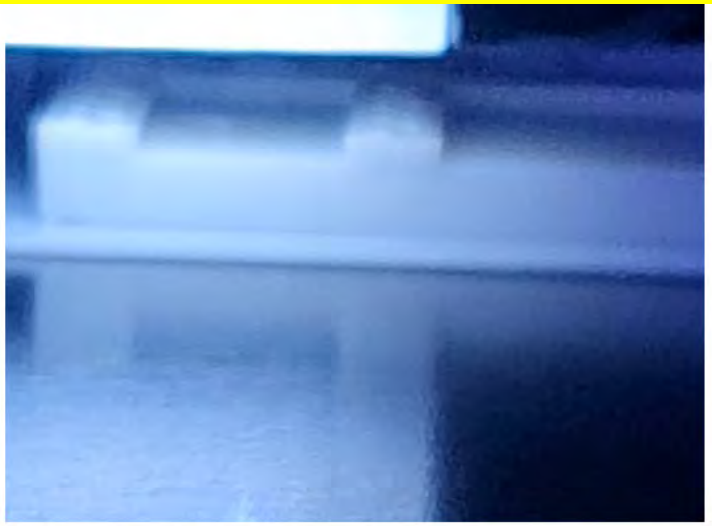


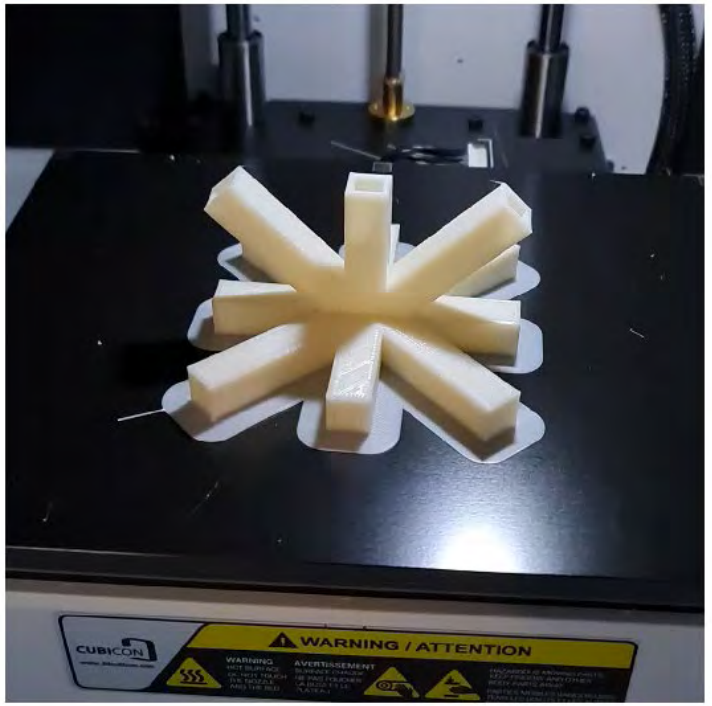
DERZ -2019 Collective Installation (~300 compressed paper bricks)

Experiential Learning in the Undergrad First-year Program
2021-2022
Water Harvester / Fog Catcher

Experiential Learning in the Undergrad First-year Program
2021-2022
Water Harvester / Fog Catcher







Experiential Learning in the Undergrad First-year Program
2021-2022
Water Harvester / Fog Catcher

Experiential Learning in the Undergrad First-year Program
2021-2022
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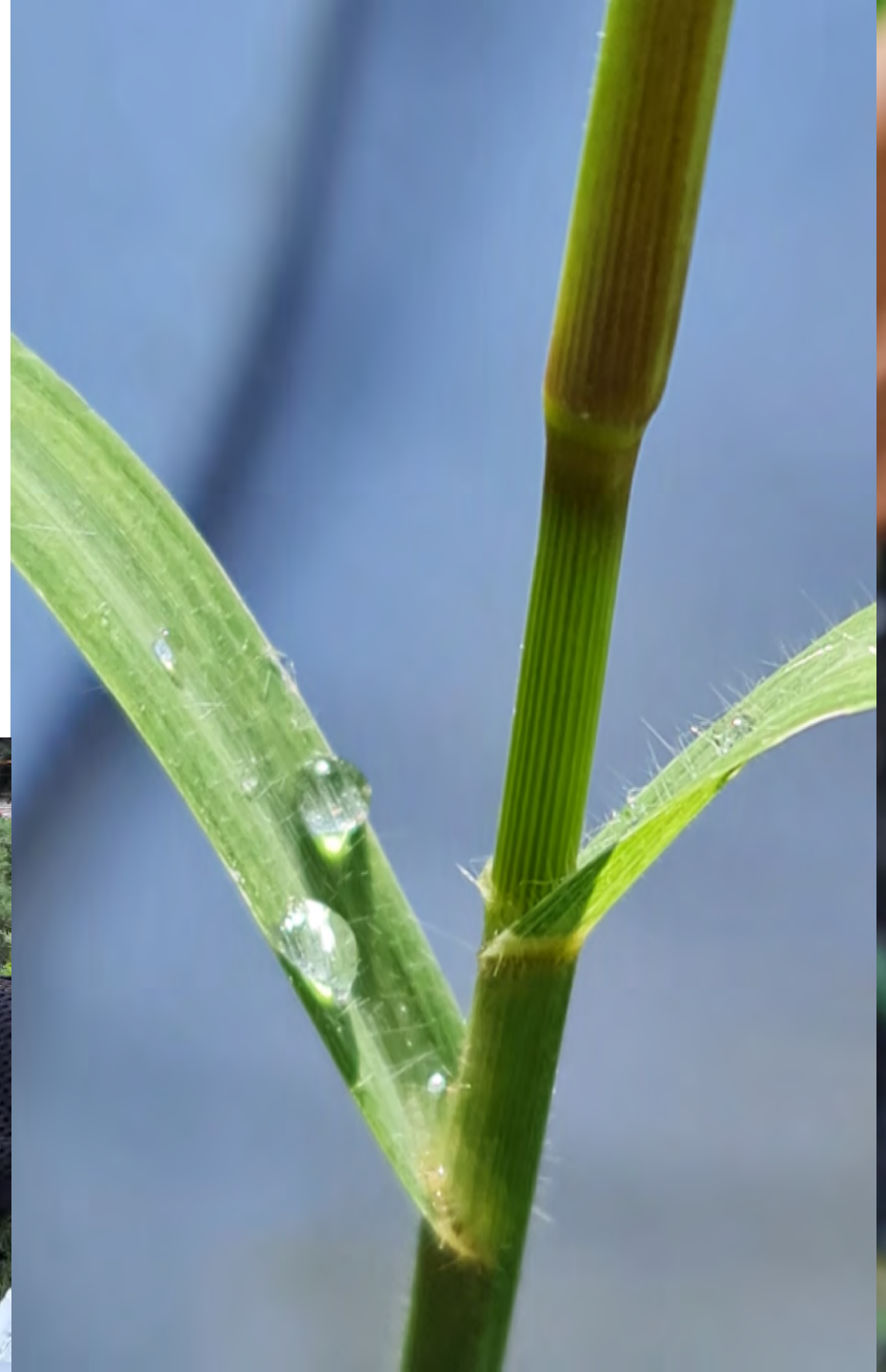
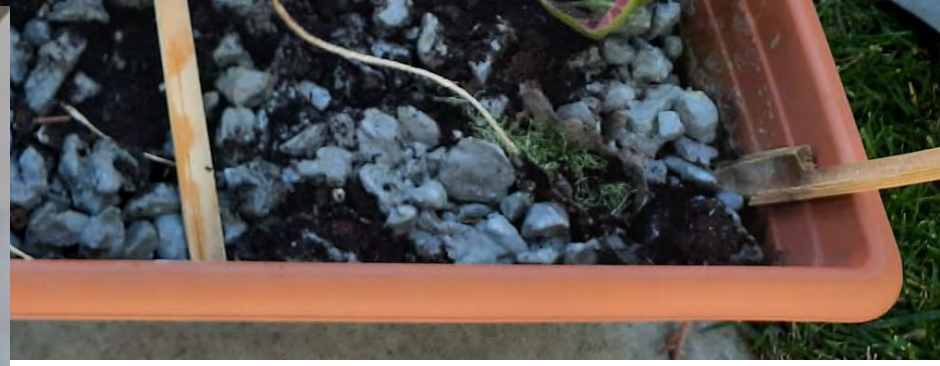
Experiential Learning in the Undergrad First-year Program
2021-2022
Water Harvester / Fog Catcher

Experiments in Graduate Courses
2022 Summer

Plants as water source for Green Porous Concrete

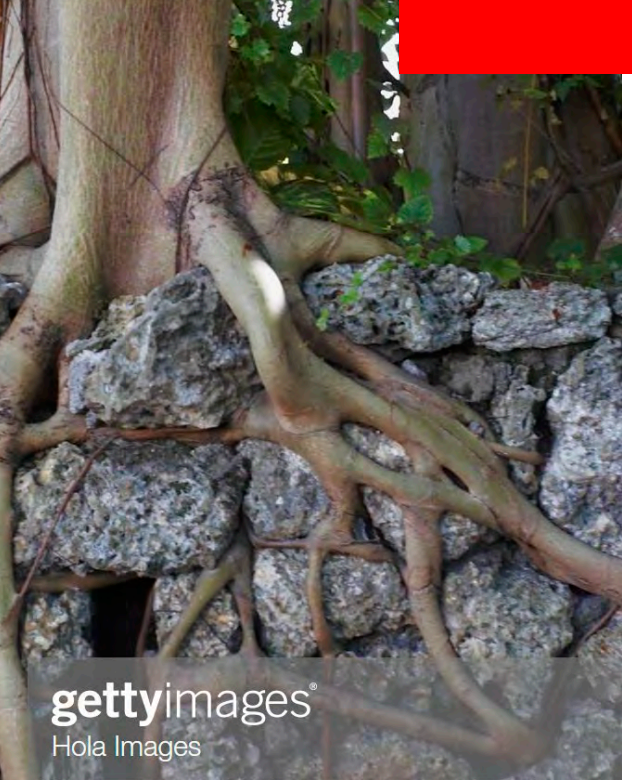


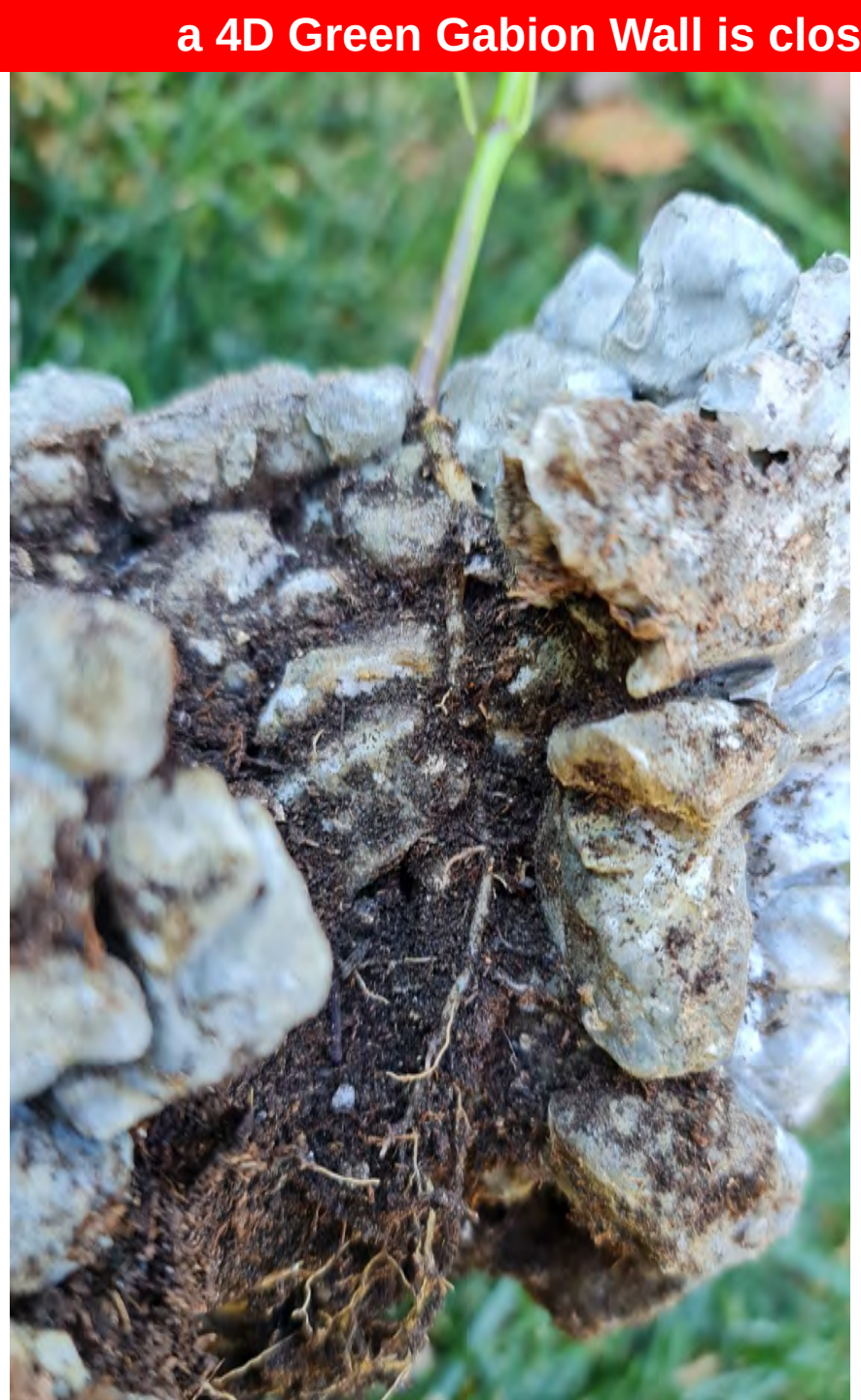


Experiments in Graduate Courses
2022 Summer Semestre / Interaction – Intersection - Communication

Life is always right (Le Corbusier)

a 4D Green Gabion Wall is close enough.





Experiential Learning in the First-year Program
2022-2023
A Game for Sustainable Development Goals

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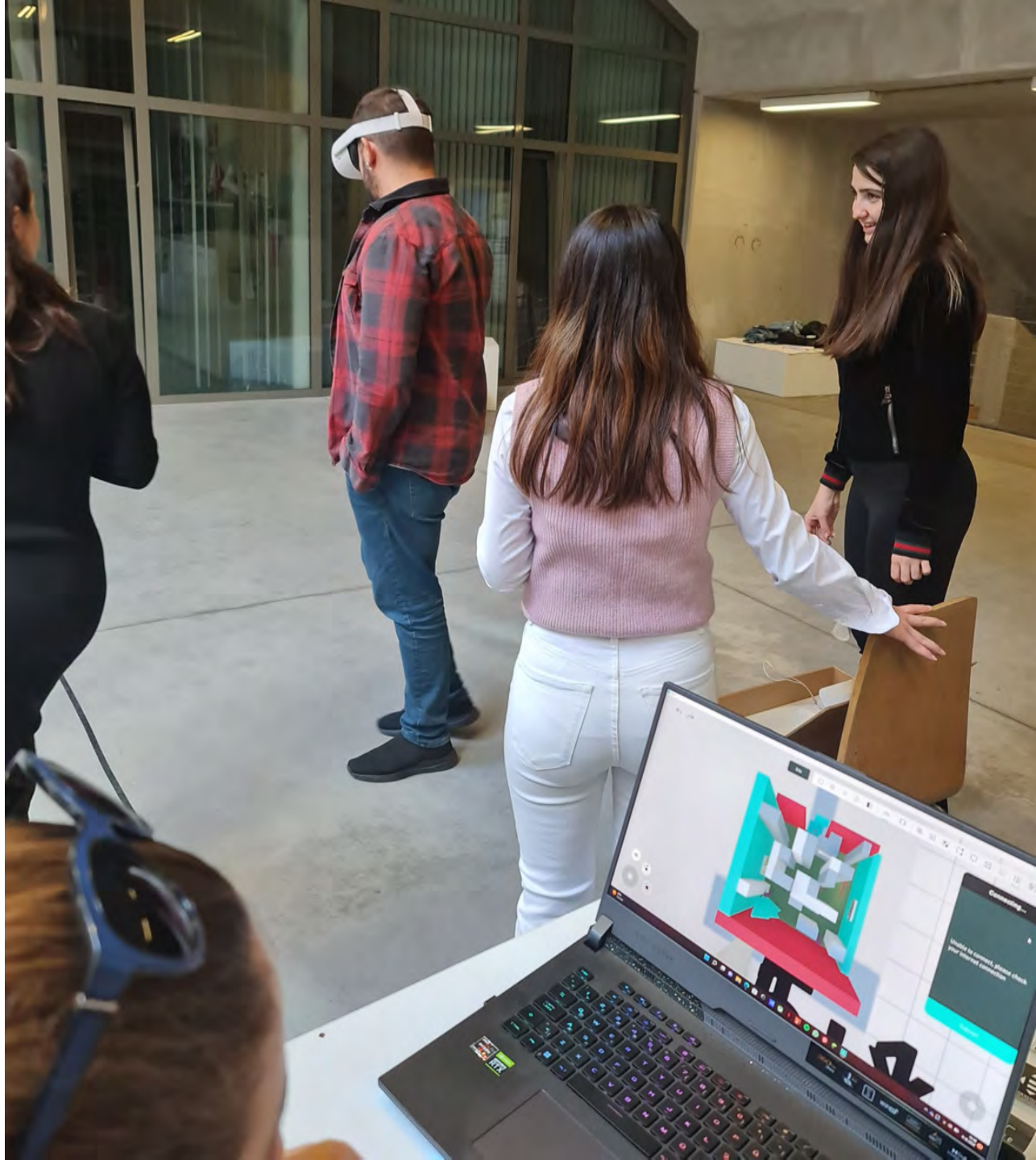
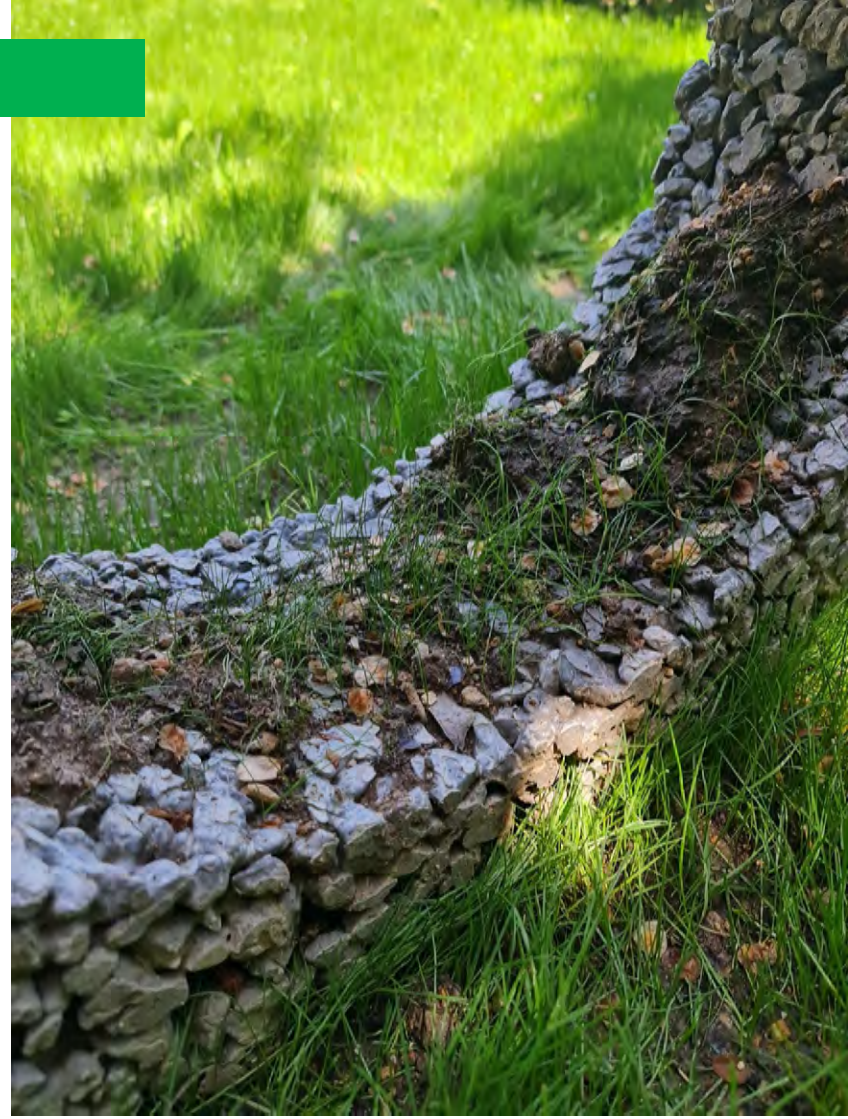


An experiment: First green tower

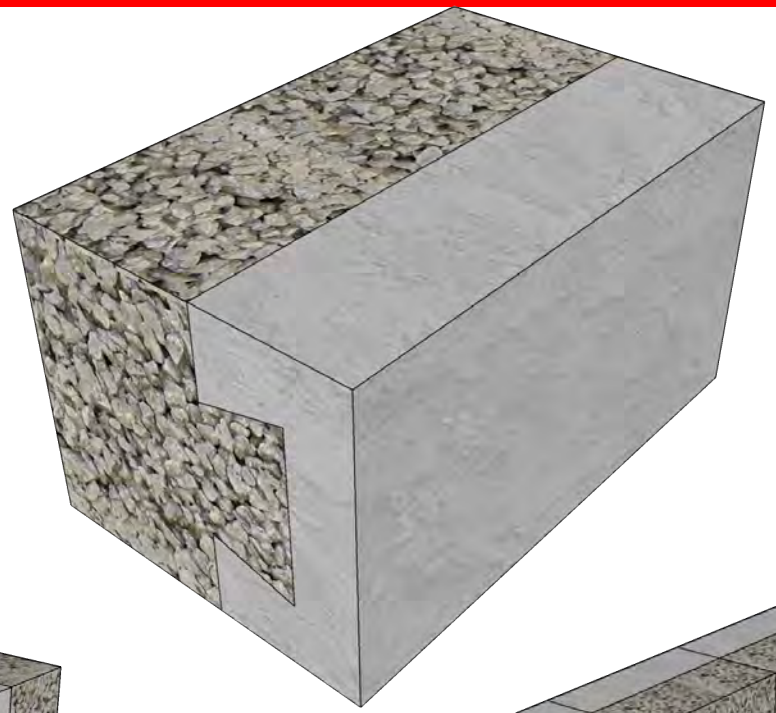


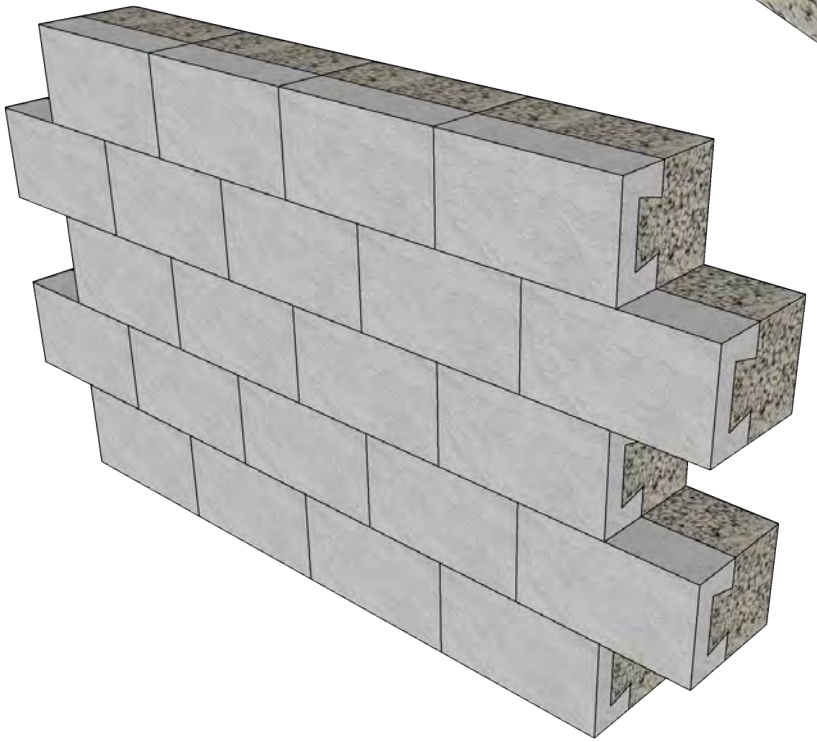
2022
ÇEİS Courtyard

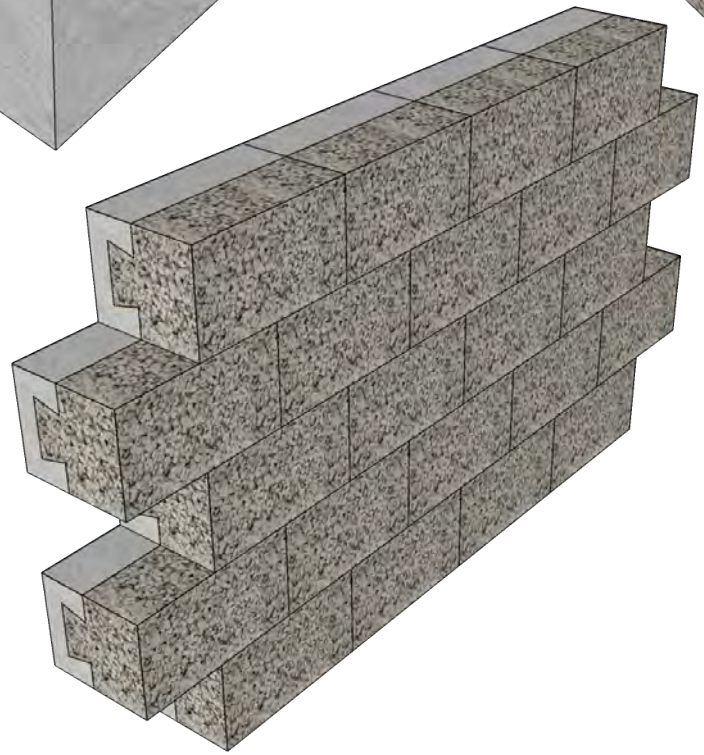
An experiment: First green tower

2023
ÇEİS Courtyard

A NEW HOPE
GREEN WALL UNIT WITH BIOPLASTIC CAPSULATED SEEDS



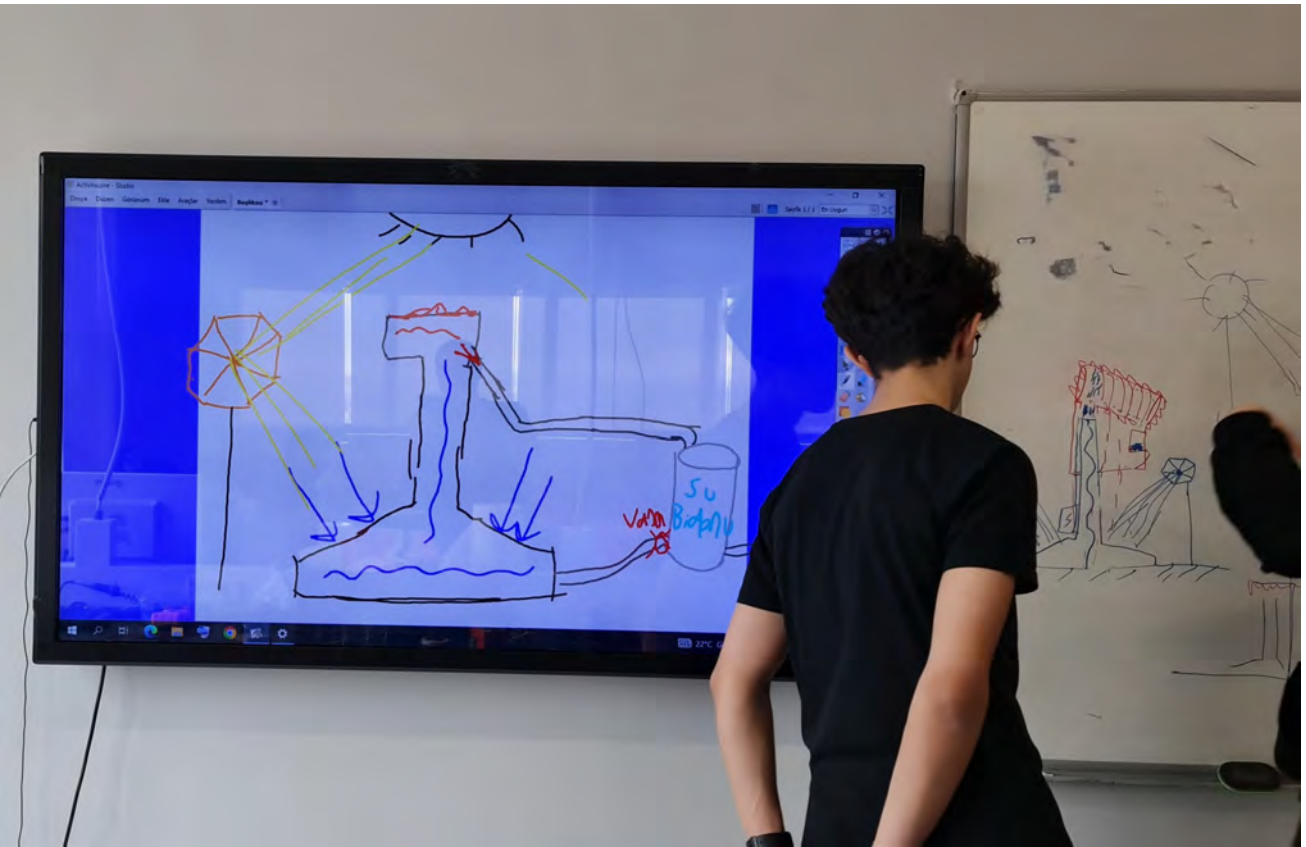




Patent Application with support of the University

Innovation for Climate / A High School Experience

2-hours course for 9th and 10th graders.
Design of a updraft chimney for wind energy and water harvesting.
Climate awareness and innovative experiements on energy, water and circularity.



We play, learn, enjoy, and appreciate planet earth

SPECIAL THANKS TO:

ALL OF THE FIRST-YEAR STUDENTS...

MUSTAFA KOÇ
ŞEYMA NUR ÇALIŞKAN
SELDA BANCI
BERK MUTLU
GÜNSU MERİN ABBAS

THANK YOU...

Dr. Aktan Acar

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