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2023-1-FR01-KA210-000156118
"Innovative and Technological Content Development Applications in Education"

INNOVATION AND TECHNOLOGY BASED STEM EDUCATION E-BOOK

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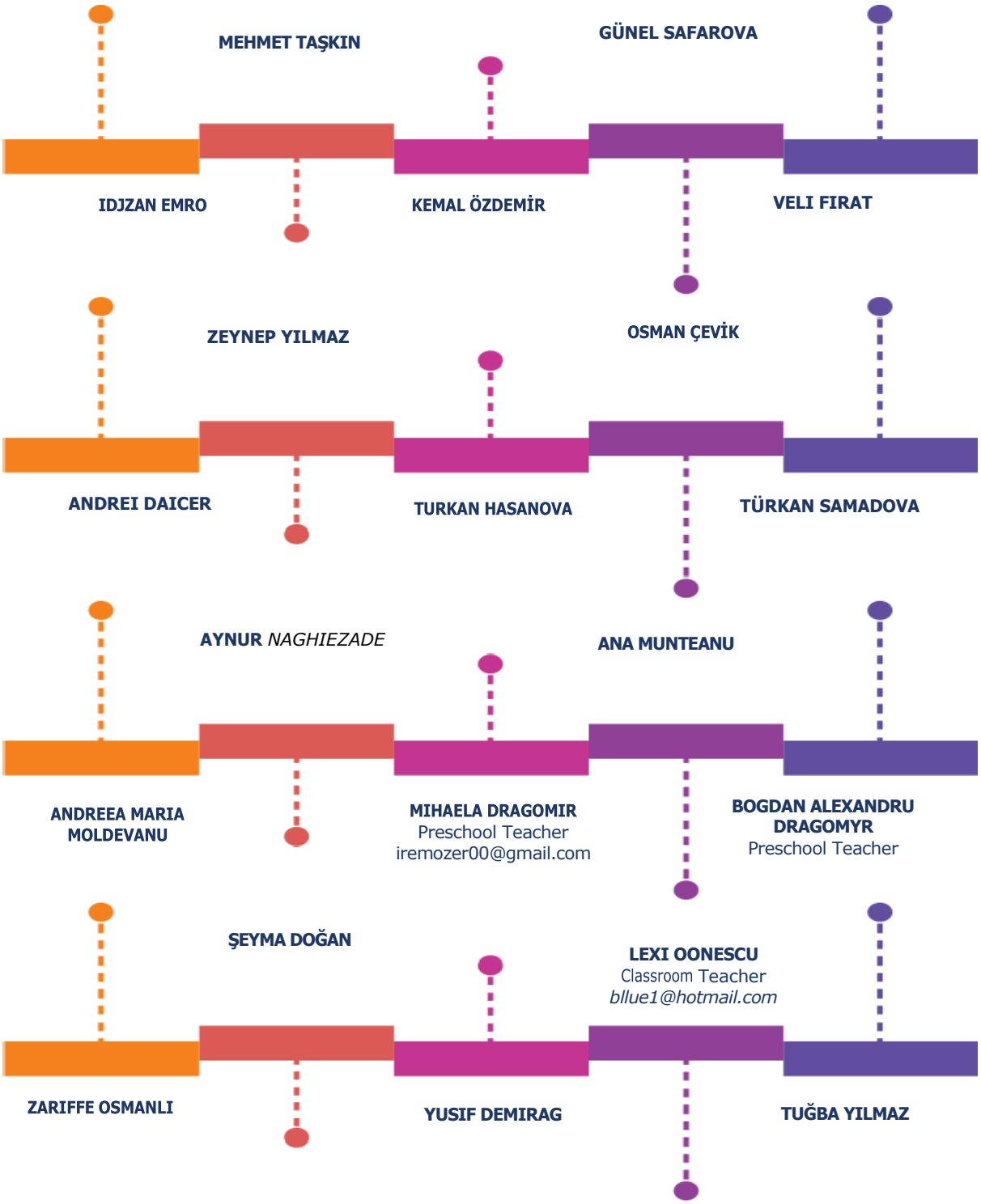
Alim ASSOCIATION SCIENTIFIQUE

ACCES

OUR AUTHORS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INTRODUCTION

In recent years, there have been radical changes in our educational philosophy in order to equip individuals with problem-solving skills and skill-based approaches. "Human" is at the center of these changes. In today's world, where traditional methods of transferring knowledge and providing solutions are inadequate, education programs and approaches appropriate to the characteristics of individuals should be developed with human-oriented education systems.

Changing world conditions are transforming the needs and priorities of individuals. It is imperative to keep pace with these changes; otherwise we may face the risk of regression as individuals and as a society. Our education system is at the center of this renewal, and within the framework of the 2023 Education Vision, practices, models and methods that support innovations in education and provide mobility are of great importance. One of the most important elements of these innovations is high-level skills, known as 21st century skills. These skills include problem solving, critical thinking, collaboration, communication, creativity, responsibility and technology literacy (Partnership for 21st Century Skills, 2009). The acquisition of these skills by students is critical in terms of building a foundation, especially at the primary school level (Silva, 2009). In addition, laying the foundations of these skills in preschool periods contributes to the development of children's questioning, problem solving and creativity skills (Şahin & Yıldırım, 2004; Torres-Crospe, Kraatz, & Pallansch, 2014; Kale, 2019). These skills gained at an early age will play an important role in students' lives and career planning.

To develop 21st century skills, STEM (Science, Technology, Engineering and Mathematics) education has been integrated into education systems in many countries in recent years. STEM education is an approach in which these disciplines are taught in an interconnected way and aims to gain high-level skills (Bybee, 2013). In STEM education, various applications are carried out to improve students' ability to solve problems in their daily lives.

2023-1-FR01-KA210-000156118 "Innovative and Technological Content Development Applications in Education "STEM Applications with Gain-Focused Problem Scenarios, developed in 2017, offers an effective method to achieve these goals. This application enables students to address problem situations through scenarios and produce solutions. The 8-stage activity process is organized as follows:

1. **Scenario:** Students are presented with scenarios involving a problem selected from real life.
2. **Problem:** The problem to be solved through the scenario is determined.
3. **Idea Generation:** Students develop various solutions to the problem and discuss them in the group.
4. **Prototyping:** A modeling is made for the selected solution proposal.
5. **Trial:** Prototypes are tested and their functionality evaluated.

6. **Presenting the Prototype:** Groups present their solutions to others and receive feedback.
7. **Assessment:** Process and results are measured using rubrics, observation forms and evaluation tools.
8. **Improvement:** Solution proposals are revised and improved in line with feedback.

These stages can be organized according to participant levels. STEM activities aim to develop students' 21st century skills. Practices, especially at the preschool level, contribute to the development of high-level skills in children at an early age.

Those who follow development and change are always one step ahead. Strengthening our education system with these innovative approaches and practices is critical for the future success of individuals and society.

Bibliography

- Belet Boyacı, Ş. D., & Atalay, N. (2016). A scale development for 21st century skills of primary school students a validity and reliability study. *International Journal of Instruction, 9*(1), 1308-1470.
- Bybee, R. W. (2013). The case for STEM education: challenges and opportunities. *Virginia: NSTA Press*, 116 p.
- Kale, S. & Yoldaş, C. (2021). Examining the effect of STEM applications on preschool teachers' scientific process skills. *Turkish Studies - Education, 16*(1), 383-397.
- Kale, S. (May 2-5, 2018). STEM applications with economic materials for science achievements in disadvantaged schools: The case of Gaziantep province. *Vth International Eurasian Educational Research Congress,* pp.749-751.
- Kale, S. (2019). *Investigation of the effect of STEM applications on pre-school teachers' scientific process skills* [master's thesis]. Manisa Celal Bayar University Institute of Science and Technology.
- Kaptan, F., Korkmaz, H. (2001). Problem-based learning approach in science education, *Hacettepe University Journal of Faculty of Education*, 20, 191-192
- Partnership for 21st Century Skills (2009) Framework for 21st century learning. Access Available at: http://www.p21.org/our-work/p21-framework
- Şahin, F. & Yıldırım, M. (June 30-July 3, 2004). A research on case-based problem solving in preschool. *I. International Preschool Education Conference*, (Proceedings Book-1 p.201-210).
- Torres-Crospe, M. N., Kraatz, K. & Pallansch, L. (2014). From fearing STEM to playing with it: The natural integration of STEM into the preschool classroom. *SRATE Journal. 23*(2), 8-16.

Grandma's Elevator

Course Title:	Fen and Integrated Art Activity	**Subject:**	Roller Systems

Gains in Cognitive Development:

Gain 1: Pay attention to the object/situation/event (Indicators: Attention to focuses on the required object/situation/event).

Gain 2: Makes predictions about the object/situation/event (Indicators: Says the prediction by combining the clues of the object/situation/event).

Outcome 12: Recognizes geometric shapes. Indicators: Shows objects that look like geometric shapes).

Gain 17: Establishes a cause-effect relationship (Indicators: States the possible causes and possible consequences of an event).

Outcome 19: Generates solutions to problem situations (Indicators: Suggests creative solutions to problems).

Language Development Outcomes:

Gain 7. Comprehends the meaning of what he/she listens/watches. (Indicators: Makes comments about what he/she listens/watches.)

Outcome 10: Reads visual materials (Indicators: Examines visual materials. Answers questions about visual materials.

Social Emotional Development Gains:

Outcome 3: Expresses himself/herself in creative ways (Indicators: Expresses feelings, thoughts and dreams in original ways. Uses objects out of the ordinary. Creates products with original features.)

Outcome 7: Motivates himself/herself to accomplish a job or task (Indicators: Shows effort to finish what he/she has started on time).

Gain 15: Confidence (Indicators: Expresses himself/herself in front of the group).

Motor Development Gains:

Gain 4: Performs movements that require the use of small muscles (Indicators: Cuts materials. Glues the materials. Brings objects together to form new shapes).

Gains in Self-Care Skills:

Outcome 7: Protects himself/herself from dangers and accidents (Indicators: Knows basic safety rules. Seeks help in case of danger and accidents).

Outcomes of STEM Discipline:

Technology Outcomes: T.T.8.B.1.5.Designs a product that can be used in the future in accordance with the concept of smart product. (Indicators: Identifies the problem that may be encountered in the future, defines it and designs a smart product to solve the defined problem).

T.T.8.D.1.4.Creates an original design model or prototype.

T.T.8.D.1.6.Reconfigures the product he/she designed. (Indicators: Reconfigures the product according to the evaluation results.)

Engineering Outcomes: T.T.7.B.2.1.Makes draft drawings for design. (Indicators: Shows the solution proposal for the problem encountered in real life or the dream that can be realized on paper in two dimensions).

Gains in 21st Century Skills: Develops problem solving, critical thinking, creativity, and acting in harmony with others.

Tools and Materials	Teaching Methods and Techniques	Concept, Symbol and Words	Safety Precautions
• Rectangular and square boxes • Spool of rope • Long stick • Adhesive • Meter • Paper • Colored pencils • Scissors	• Problem-based learning • Project-based learning • Question and answer • Small group work • Brainstorming	• Reel • Design • Production • Invention • Rectangle Square • High - Low • Machine Engineer	• Necessary safety precautions will be taken by the teacher.

1. STAGE SCENARIO: (5 min.)

Zeynep was a little girl going to kindergarten. On their way home from school, she and her mother would often visit her elderly grandmother, whose knees ached, and take care of her needs. One day, on the way back from school, she and her mother did some grocery shopping for her grandmother and went to visit her grandmother who lived on the fifth floor. But when they arrived at the apartment building, they saw that the elevator was broken. When they climbed the stairs to the fifth floor with the grocery bags in their hands, they were very tired and Zeynep thought of her grandmother. How could an old woman with aching knees climb so many stairs? How difficult would our lives be without elevators? I wonder who invented the elevator? And how do elevators work? Zeynep made a promise to herself. The first thing she would do when she got home was to find an answer to all these questions.

2. PHASE PROBLEM: (5 min.)

The teacher gives the floor to all children and together they analyze the problem. The teacher takes note of all the children's ideas and asks them the following questions.

- What kind of a problem did Zeynep face when she went to visit her grandmother?
- How did Zeynep feel when she went up to the fifth floor with the grocery bags?

- What questions came to Zeynep's mind when she saw that the
- What would you do if you were in Zeynep's place?
- Have you ever been in an elevator?
- Have you ever wondered how elevators work?
- What do mechanical engineers do?
- Do you want to build your own elevator?

At this stage, a video on roller systems can be watched.

https://www.youtube.com/watch?v=HvR1UzL1ELY

3. STAGE IDEA GENERATION: (15 min.)

What can we do for the sick and elderly who do not live in houses with elevators? The question is asked to the children. The answers given by the children are listened to and noted by the teacher. After listening to all the ideas about the problem situation, a common idea is determined unanimously. Then the prepared materials are presented to the children and the children are asked to design elevators for the sick and elderly who do not live in houses with elevators with the materials they choose.

4. STAGE PROTOTYPE CREATION: (20 min.)

The teacher divides the children into groups. Necessary materials are placed on the table of each group. First, the children are asked to imagine what kind of product they will make with the existing materials and draw it on the given papers. Then the children design the products they have drawn under the guidance of the teacher.

Making the Design:

- All materials are placed on the tables by the teacher.
- Children design their products using materials.
- Each group decides together to create a symbol (a flower, a geometric shape, an aquatic animal, etc.).
- The symbols determined by the group are drawn and colored on a piece of paper by the children.
- Groups decorate their products by pasting their symbols on the products they have designed.

5. PHASE TRIAL: (10 min.)

Children test their designed products in the presence of the teacher. It is observed whether the designed elevator serves the purpose or not.

6. STAGE PROTOTYPE PRESENTATION: (20 min.)

Students sit in a U-shape. Each group takes turns to come to the presentation area and present the product they designed to the other groups. They share which materials they used in their designs and which stages they followed. They explain the contribution of their product to the problem situation. The similarities and differences between the products of other groups and their own products are examined.

STAGE 7 EVALUATION: (10 min.)

Rubric - 1: Rubric Evaluation

Evaluation Criteria	4	3	2	1
Defining the problem				
Presenting original ideas				
Using time efficiently				
Collaborative work				
Presenting the product				

**Evaluates and scores the products of practitioner groups according to the evaluation rubric.*

Rubric - 2: The social product can be a concrete object, algorithm, mathematical model (equation, graph) or research design (experimental setup).

Category.	4	3	2	1	Points Awarded
Idea Development	It is clear that existing known models and knowledge are taken into account in the product.	The idea behind the product is clear and easy to understand.	Some points in the product idea are not clear and need clarification.	It did not take into account known models.	
Problem Relationship	The desired criteria are emphasized and detailed information is provided. In addition, some points are above the desired level and deepening is provided.	Desired criteria were emphasized and detailed information was provided.	The desired criteria are emphasized but the information used is limited.	Not all the limitations highlighted in the problem were taken into account.	
Quality (Integrity, accuracy)	The product is correctly finished and looks attractive. The project is enriched with personal touches.	The product has been completed correctly and it is clear that care has been taken.	The product is complete but some details are limited in terms of care.	The product is incomplete, some parts are missing and no care has been taken.	
Use of Materials (tools, materials, mechanics, etc.)	The given materials were used correctly. The appeal and originality of the product is enhanced by small creative adaptations of the materials.	The given materials were used correctly.	The materials provided were incomplete and used in a sloppy manner.	The materials given were too limited to be sufficient to create the product.	

Category.	4	3	2	1	Points Awarded
Authenticity	The product shows completely original thinking and creative ideas. It contains a personal touch. It is unorthodox and surprising.	The product presents some original ideas and different perspectives.	The instructions given while creating the product were used, but the product could not reveal its own results. It was limited in terms of attractiveness.	The product is not original. Only the information given is repeated. It is an ordinary product without care and attention. The product does not go beyond the instructions given when creating the product.	
Total points					**...../..../....**

Evaluation Criteria	☺	☹
Does it match the product design?		
Does the product meet the need?		
Is the product safe for use?		

***Checklist:** (All groups evaluate the products of other groups according to the evaluation criteria and points).*

***Suggestion to the Practitioner:** Adhesive stickers can be used for evaluation.*

STAGE 8 DEVELOPMENT: (10 min.)

After sharing, students are asked what they can do to improve their designs. They talk about what they would change if they wanted to design a product again. They discuss which different materials could be used to solve the problem. Students improve their designs if they need to.

PROPOSAL FOR FAMILY PARTICIPATION:

Suggest that families take a ride in an elevator with their children and talk about how the elevator works.

ADVICE TO PRACTITIONERS:

Families can be asked to help provide materials. Working with refrigerator boxes will increase reality. Adhesive stickers can be used for evaluation.

SOURCES:

- YOUTUBE -Lesson with Experiments -Mools (Quote Date:20.01.2021)
- https://www.youtube.com/watch?v=HvR1UzL1ELY

Let's Utilize Our Waste Water

Course Title:	Science and Nature	Subject:	Recycling

Gains in Cognitive Development:

Gain1: Pay attention to the object/situation/event (Indicators: Focuses on the object/situation/event that needs attention).

Gain 2: Makes predictions about the object/situation/event (Indicators: Says the prediction by combining the clues of the object/situation/event).

Gain11: Measures objects. (Indicators: Estimates the result of measurement. Says the result of measurement.)

Gain 17: Establishes a cause-effect relationship (Indicators: States the possible causes and possible consequences of an event).

Outcome 19: Generates solutions to problem situations (Indicators: Suggests creative solutions to problems).

Gain 20: Prepares object graphs (Indicators: Creates graphs by showing objects with symbols).

Language Development Outcomes:

Gain 7: Understands the meaning of what he/she listens/watches. (Indicators: Makes comments about what he/she listens/watches.)

Outcome 10: Reads visual materials (Indicators: Examines visual materials. Answers questions about visual materials).

Social Emotional Development Gains:

Outcome 3: Expresses himself/herself in creative ways (Indicators: Expresses feelings, thoughts and dreams in original ways. Uses objects out of the ordinary. Creates products with original features.)

Outcome 7: Motivates himself/herself to accomplish a job or task (Indicators: Shows effort to finish what he/she has started on time).

Gain 15: Confidence (Indicators: Expresses himself/herself in front of the group).

Motor Development Gains:

Gain 4: Performs movements that require the use of small muscles (Indicators: Cuts materials. Glues the materials. Brings objects together to form new shapes).

Gains in Self-Care Skills:

Outcome 7: Protects himself/herself from dangers and accidents (Indicators: Knows basic safety rules. Seeks help in case of danger and accidents).

Outcomes of STEM Discipline:

Technology Outcomes: T.T.8.B.1.5.Designs a product that can be used in the future in accordance with the concept of smart product. (Indicators: Identifies the problem that may be encountered in the future; defines this problem and designs a smart product for its solution).

T.T.8.D.1.4.Creates an original design model or prototype.

T.T.8.D.1.6.Reconfigures the product he/she designed. (Indicators: Reconfigures the product according to the evaluation results.)

Engineering Outcomes: T.T.7.B.2.1.Makes draft drawings for design. (Indicators: Shows the solution proposal for the problem encountered in real life or the dream that can be realized on paper in two dimensions).

Gains in 21st Century Skills: Develops problem solving, critical thinking, creativity, and acting in harmony with others.

Tools and Materials	Teaching Methods and Techniques	Concept, Symbol and Words	Safety Precautions
• Carboy drum • Sink drain pipe • Adhesive • Meter • A/4 Paper • Colored pencils • Scissors	• Research - Review • Problem-based learning • Project-based learning • Question and answer • Small group work • Brainstorming	• Recycling • Design • Mechanic • Waste • Graphic • Observation • Less-More	• Necessary safety precautions will be taken by the teacher.

1. STAGE SCENARIO: (5 min.)

Five-year-old Selim had learned at school that he had to wash his hands often with soap to avoid getting sick from germs and viruses. So he washed his hands often with soap and water. But one day when he returned home after playing in the park and went to the sink to wash his hands, he saw that the water was not running from the faucet. He immediately called his mother. His mother came to Selim and told him that the water had been cut off. She explained that there was a water shortage in their city because it had not rained for a long time. Selim felt very sad because he could not wash his hands and felt dirty. He thought about how important water is for us to be clean. His mother poured water from the jerry can and Selim washed his hands. Later he was going to go out on the balcony to look after his cat Yumak, but he saw that the balcony was not washed. There was no more water in the jerry can. He decided he had to do something. Could he use the water he used to wash his hands again?

2. PHASE PROBLEM: (5 min.)

The teacher gives the floor to all children and they analyze the problem together. They are asked how they can help Selim. The teacher takes note of all

Outcomes of STEM Discipline:

the children's ideas and asks them the following questions:

- Why couldn't Selim wash his hands?
- How did Selim feel when he couldn't wash his hands?

- Why was the Selims' water cut off?
- Have you ever had a water cut in your house?
- What can happen if we waste our water by using it unnecessarily?
- Do you have a dripping faucet in your home?
- Who fixes dripping faucets?
- Do you think waste water can be reused?

At this stage, the documentary 25 Liters, which explains the importance of water, and What If There Was No Water?
What if? videos can be watched.

https://www.youtube.com/watch?v=w4pPjndoxKc

https://youtu.be/Nmtl7uEmJ04

3. STAGE IDEA GENERATION: (15 min.)

Children are asked the question "How can we utilize our waste water?". The answers given by the children are listened to and noted by the teacher. After listening to all the ideas about the problem situation, a common idea is determined unanimously. Then the prepared materials are presented to the children and they are asked to design a product that we can collect and reuse our waste water with the materials they choose.

4. STAGE PROTOTYPE CREATION: (20 min.)

The teacher divides the children into groups. Necessary materials are placed on the table of each group. First, the children are asked to imagine what kind of product they will make with the existing materials and draw it on the given papers. Then the children design the products they have drawn under the guidance of the teacher.

Making the Design:

- All materials are placed on the tables by the teacher.
- Children design their products using materials.
- Each group decides together to create a symbol (flower, heart, star, etc.).
- The symbols determined by the group are drawn and colored on a piece of paper by the children.
- Groups decorate their products by pasting their symbols on the products they have designed.

5. PHASE TRIAL: (10 min.)

Accompanied by the teacher, the children place their designed products under the sinks in the restroom. The faucet is opened and it is tested whether the water flowing from the sink pipe fills the designed product. The water filling the product is measured with the help of a meter at certain intervals. The results are recorded by the children on the chart prepared by the teacher. The children talk about how much water accumulates in the designed products. The children talk about where the accumulated water will be used (washing the toilets, washing the garden, etc.).

Measurement 1.	2.Measurement	3.Measurement	4.Measurement	5.Measurement

**Sample Measurement Table*

6. STAGE PROTOTYPE SUBMISSION:

Students sit in a U-shape. Each group comes to the presentation area in turn and presents the product they designed to the other groups. They share which materials they used in their designs and which stages they followed. They explain the contribution of their product to the problem situation. The similarities and differences between the products of other groups and their own products are examined.

7. STAGE EVALUATION: (10 min.)

Rubric - 1: Rubric Evaluation

Evaluation Criteria	4	3	2	1
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Presenting original ideas				
Using time efficiently				
Collaborative work				
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Idea Development	It is clear that existing known models and knowledge are taken into account in the product.	The idea behind the product is clear and easy to understand.	Some points in the product idea are not clear and need clarification.	Known models did not take it into account.	
Problem Relationship	The desired criteria are emphasized and detailed information is provided. In addition, some points are above the desired level and deepening is provided.	Desired criteria were emphasized and detailed information was provided.	The desired criteria are emphasized but the information used is limited.	Not all the limitations highlighted in the problem were taken into account.	
Quality (Integrity, accuracy)	The product is correctly finished and looks attractive. The project is enriched with personal touches.	The product has been completed correctly and it is clear that care has been taken.	The product is complete but some details are limited in terms of care.	The product is not complete. Some parts of the product are missing and sloppy.	

Category.	4	3	2	1	Points Awarded
Use of Materials (tools, materials, mechanics, etc.)	The given materials were used correctly. Product attractiveness through small creative adaptations of materials and its authenticity is enriched.	The given materials were used correctly.	The materials provided were incomplete and used in a sloppy manner.	The materials given were too limited to be sufficient to create the product.	
Authenticity	The product shows completely original thinking and creative ideas. It contains a personal touch. It is unorthodox and surprising.	The product presents some original ideas and different perspectives.	The instructions given while creating the product were used, but the product could not produce its own results. Attractiveness limited in context.	The product is not original. Only the information given is repeated. It is an ordinary product without care and attention. The product does not go beyond the instructions given when creating the product.	
Total points					**...../..../....**

****Checklist:** (All groups evaluate the products of other groups according to the evaluation criteria and points).*

Evaluation Criteria	☺	☹
Does it match the product design?		
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Is the product safe for use?		

***Suggestion to the Practitioner:** Adhesive stickers can be used for evaluation.*

8. STAGE DEVELOPMENT: (10 min.)

After sharing, students are asked what they can do to improve their designs. They talk about what they would change if they wanted to design a product again. They talk about which different materials can be used to solve the problem. Students improve their designs if they need to.

PROPOSAL FOR FAMILY PARTICIPATION:

Families are advised to talk with their children about saving water and to fix dripping faucets if they have any.

ADVICE TO PRACTITIONERS:

The recommended time to test the product may vary. Families may be asked to help provide materials. Adhesive stickers can be used for evaluation.

SOURCES:

- YOUTUBE - "25 Liters" documentary (Retrieved 18.01.2021)
- https://www.youtube.com/watch?v=w4pPjndoxKc
- YOUTEBE -What would happen if there was no water? (Retrieved 20.01.2021)

- https://youtu.be/Nmtl7uEmJ04

Where are my

Course Title:	Game, Art	Subject:	Integrated Group Activity

Disciplinary Outcomes at the Center

Cognitive Development:

K1 Pay attention to the object/situation/event.

Indicator 1: Focuses on the object situation that needs attention.

Social-Emotional Development:

K10 Fulfills his/her responsibilities.

Indicators 1: Shows willingness to take responsibility.

Motor Development:

K4 Performs movements that require small muscle use.

Indicator 6: Combines objects to form new shapes.

Other STEM Discipline Outcomes

The student predicts the performance, reliability and failure of alternative solutions.

The student examines how engineering practices affect humanity environmentally, economically and politically.

The student identifies the processes involved in an engineering project. Explain the stages such as planning, prototyping, design, execution, quality control and reporting.

1. STAGE SCENARIO: (5 min)

It is a reinforcement activity designed assuming that the topics of our body and organs have been covered.

https://www.youtube.com/watch?v=ZK_hHQQ3KMw

Curiosity is aroused by watching the video. Then the teacher asks questions such as what were the things that attracted your attention in the cartoon and gets the students' answers. Usage areas in daily life are shown with various examples. It is explained that the magnet is a device with push and pull force. It shows that there are two poles in magnets, the same poles push each other and different poles attract each other.

Students are asked to place the organs they have created using the materials they want on the body models given to the students with the help of magnets.(Annex -1)

2. PHASE PROBLEM: (5 min)

How to create the most beautiful body model using the magnet's pulling power.

Ingredients:

- Abeslang sticks,
- Pipette,
- Stick skewers (cleaned of sharp ends),
- Plastic plate,
- Nylon
- Pieces of fabric
- Eva,
- Felt
- Mandal,
- Cardboard rolls,
- Tire,
- Adhesive
- Aluminum foil (the teacher can optionally use other leftover materials in the classroom. can use).

3. STAGE IDEA GENERATION: (15 min)

(Ideas are generated about the problem situation. All ideas are noted. Idea by voting Determined.

4. STAGE PROTOTYPE CREATION: (20 min)

The design is concretized through the idea produced. (Drawing)

5. PHASE TRIAL: (10 min)

The prototype is tested and its operation and functioning are checked. Corrections if necessary
It is done.

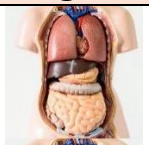
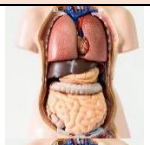
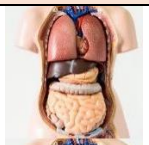
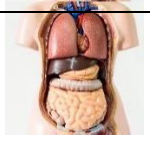
6. STAGE PROTOTYPE PRESENTATION: (20 min)

All groups present their products and are observed to see if they have done the given task.

7. STAGE EVALUATION: (10 min)

All groups evaluate and score the other groups' products according to the evaluation checklist.

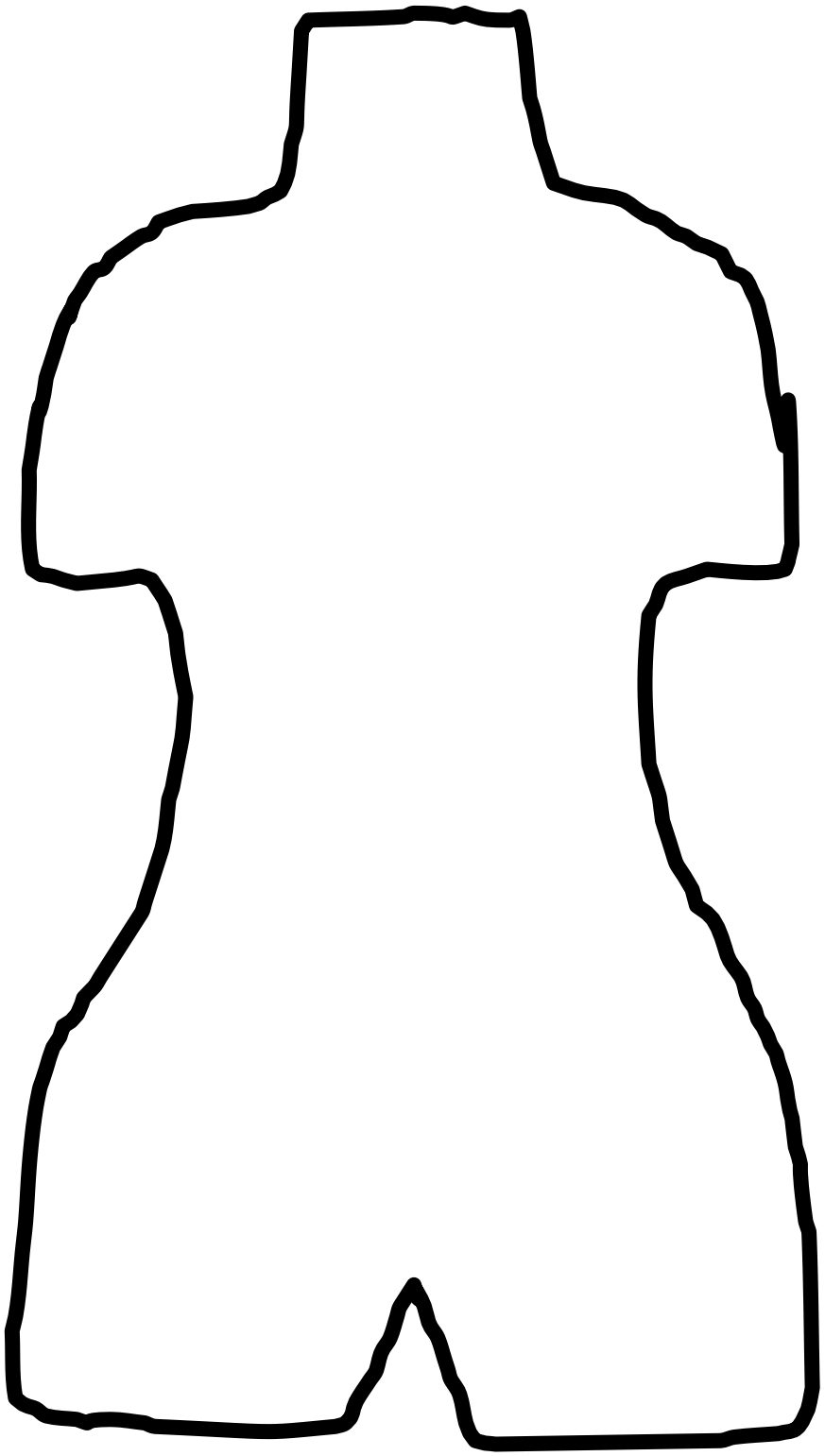
Checklist - 1

CRITERIA	Lung Team		Heart Set		Liver Team	
Location of organs Is it true?						
Are the organs authentic?						

8. STAGE DEVELOPMENT: (10 min)

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

Annex 1



Ali and Aisha on the Move

Course Title:	Science and Engineering	Subject:	Small Group Activity

Cognitive Development

Gain 2: Makes predictions about objects/situations/events (Indicators: Says his/her guess about the object/situation/event. Explains the clues related to his/her prediction. Examines the real situation. Compares his/her prediction with the actual situation.)

Outcome 19: Produces solutions to problem situations (Indicators: States the problem. Suggests various solutions to the problem. Selects one of the solutions. Explains the reason for the solution he/she chooses. Tries the solution he/she chooses. When he/she cannot reach the solution, he/she chooses a new solution. Suggests creative solutions to the problem).

Language Development

Outcome 7: Understands the meaning of what he/she listens/watches. (Indicators: Fulfills verbal instructions. Explains what he/she listens/watches. Makes comments about what he/she listens/watches.)

Outcome 10: Reads visual materials (Indicators: Examines visual materials. Explains visual materials. Asks questions about visual materials. Answers questions about visual materials.)

Social Emotional Development

Outcome 3: Expresses himself/herself in creative ways (Indicators: Expresses feelings, thoughts and dreams in original ways. Uses objects out of the ordinary. Creates products with original features.)

Motor Development

Gain 4: Performs movements that require the use of small muscles (Indicators: Collects objects. Arranges objects on top of each other / side by side / inside each other. Attaches and removes objects. Brings objects together to form new shapes. Shapes materials with their hands. Shapes materials using tools).

Other STEM Discipline Outcomes:

Technology Gains:

Recognizes the problems in his/her life.

Offers suggestions for the solution of the

problem.

Develops a draft design proposal for a solution.

Explains the construction drawing of the

design to the illustrator.

Plans and realizes the construction stages of the design

Social Product Outcomes:

The child gains the ability to design and present products.

The child gains the skills of public speaking, c o m m u n i c a t i o n , s e l f - e x p r e s s i o n , and assuming leadership when necessary.

1. STAGE DIRECTION (5 min.)

The teacher opens a lively song. At first, the teacher demonstrates the movements himself/herself and makes the students do the sports movements. Then he closes his eyes and chooses one of the students. The student he/she chooses does the sports movement. The teacher finishes the sport according to the condition of the children. The teacher asks, "Children, did you notice that every part of us moved when we did sports?" He asks, "Which organs of our body do you think we moved?" and listens to the answers of the children, starting with the willing ones. After the answers, it is mentioned that our arms, hands, feet and legs move. "Well, how do you think our body moves?" and answers are received from the children. The teacher explains how our body moves. We have a skeleton to make our body move. Our skeleton allows our body to stand in a certain way, that is, to stand, to sit, to keep our organs in our body in place. In order for our skeleton to move, there are joints that connect the bones together.

2. STAGE SCENARIO: (5 min)

In order to understand the joints better, let's watch a video, and the video to watch.

Now I would like to introduce you to Ali and Aisha. Shows Ali and Aisha to the children. Ali introduces itself.

Ali:" Hello friends, my name is Ali. I am 5 years old and I love to play ball and ride my bike. But the carpenter who made me forgot to make the joints that are necessary for my legs to move. Since my legs don't move, unfortunately I can't do these activities that I love."

Ayşe introduces herself. Ayşe: "My name is Ayşe. I also love playing house, dancing and painting. Unfortunately, I can't do these activities because the carpenter forgot to make the joints needed to move my arms and my arms don't move. Can you help us and make Ali and I move?"

The teacher shows the materials on the table and asks, "How do you think we can move Ali and Ayşe with these materials? He/she asks. The answers from the children are noted. Then they work on moving Ali and Ayşe by using the materials (chenille, straws, tongs, pushpins).

3. PHASE PROBLEM: (5 min)

Do we use joints in our daily lives? What are the benefits

of joints?

If you were a scientist, what would you invent by thinking about joints?

Ingredients:

- Plastic plate,
- Various ropes,
- Foil
- Adhesive
- Scissors,
- Hinge
- Basket
- Pipette,
- Chopsticks and ravioli
- Pasta
- Ear stick
- Rope, play dough,
- Fabric
- Cartons to be used,
- Tape,
- Joint video to watch,
- Masha
- Fastener,
- https://ders.eba.gov.tr/ders//redirectContent.jsp?resourceId=f776ebc6f3d621d4249427884624a7ba&resourceType=1&resourceLocation=2

4. STAGE IDEA GENERATION: (15 min)

(Ideas are generated about the problem situation. All ideas are noted. Idea by voting Determined.

The teacher shows the materials on the table and asks, "What kind of robot do you think we can make with these materials using the joint system?". The answers are noted. Then the children are asked to make a robot designed with joints in mind using the materials. (They are asked to design it in such a way that hands, arms, feet and legs can move).

4. STAGE PROTOTYPE CREATION: (20 min)

The design is concretized through the idea produced. (Drawing)

The teacher divides the class into groups and selects a leader. After exchanging ideas among themselves, the children obtain sufficient materials from the materials table. They are asked to draw a robot prototype with a joint system from the materials.

5. PHASE TRIAL: (10 min)

The prototype is tested and its operation and functioning are checked. Corrections if necessary
It is done.

6. STAGE PROTOTYPE PRESENTATION: (20 min)

All groups present their products and are observed to see if they have done the given task.

7. STAGE EVALUATION: (10 min)

The Whole groups other groups products evaluation rubric evaluates and scores them accordingly.

Teacher Evaluation Rubric: Social product concrete object, algorithm, mathematical model (equation, graph) or research design (experimental setup) it can happen.

Category.	4	3	2	1	Points Awarded
Idea Development	Existing known models and knowledge are taken into account within the product It is clear.	The idea behind the product is clear and easy to understand.	Some points in the idea of the product are not clear and need to be explained needs.	It did not take into account known models.	
Scenario Relationship	The desired criteria are emphasized and detailed information is provided. In addition, some points are above the desired level and deepening is provided.	Desired criteria were emphasized and detailed information was provided.	The desired criteria are emphasized but the information used is limited.	All the limitations emphasized in the script were not taken into account.	
Quality (Integrity, accuracy)	The product is correctly finished and looks attractive. The project is based on the enriched with personal touches.	The product was completed correctly and care was taken clearly understood.	The product is complete but some details are limited in terms of care.	The product is incomplete, some parts are missing and no care has been taken.	
Use of Materials (tools, materials, mechanics, etc.)	The given materials were used correctly. The appeal and originality of the product is enhanced by small creative adaptations of the materials.	The given materials were used correctly.	The materials provided were incomplete and used in a sloppy manner.	The materials given were too limited to be sufficient to create the product.	
Authenticity	The product shows completely original thinking and creative ideas. It contains a personal touch. It is unorthodox and surprising.	The product presents some original ideas and different perspectives .	The instructions given while creating the product were used, but the product could not reveal its own results. It was limited in terms of attractiveness.	The product is not original. Only the information given is repeated. It is an ordinary product without care and attention. When creating the product, you should not go beyond the instructions given. not passed.	
Total points					**...../20**

Peer Review

Groups Evaluating Each Other	☺	☹
Does it match the product design?		
Does the product work?		
Does the product meet the need?		

Self-Assessment

Which parts did you need help with? Why did you use

these materials?

What if we were robots and our inventor made our arms, fingers and legs without joints, how would we move?

If you were to do this activity again, what would you do

differently? How did you feel during the activity?

What did you like the most?

8. STAGE DEVELOPMENT: (10 min)

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

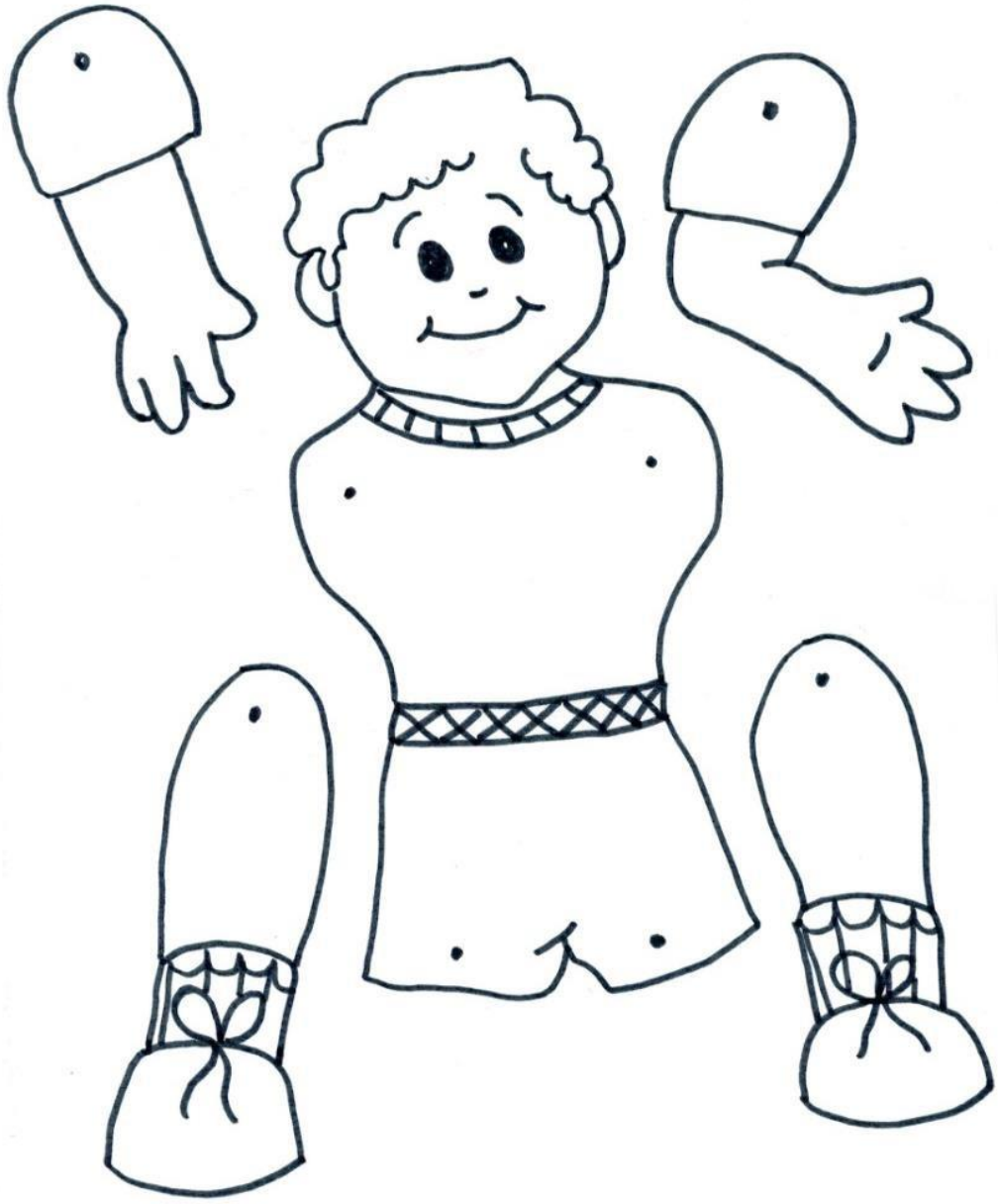
NOTES TO THE TEACHER

It will be more permanent if this activity is practiced after the activity related to the subject of our body.

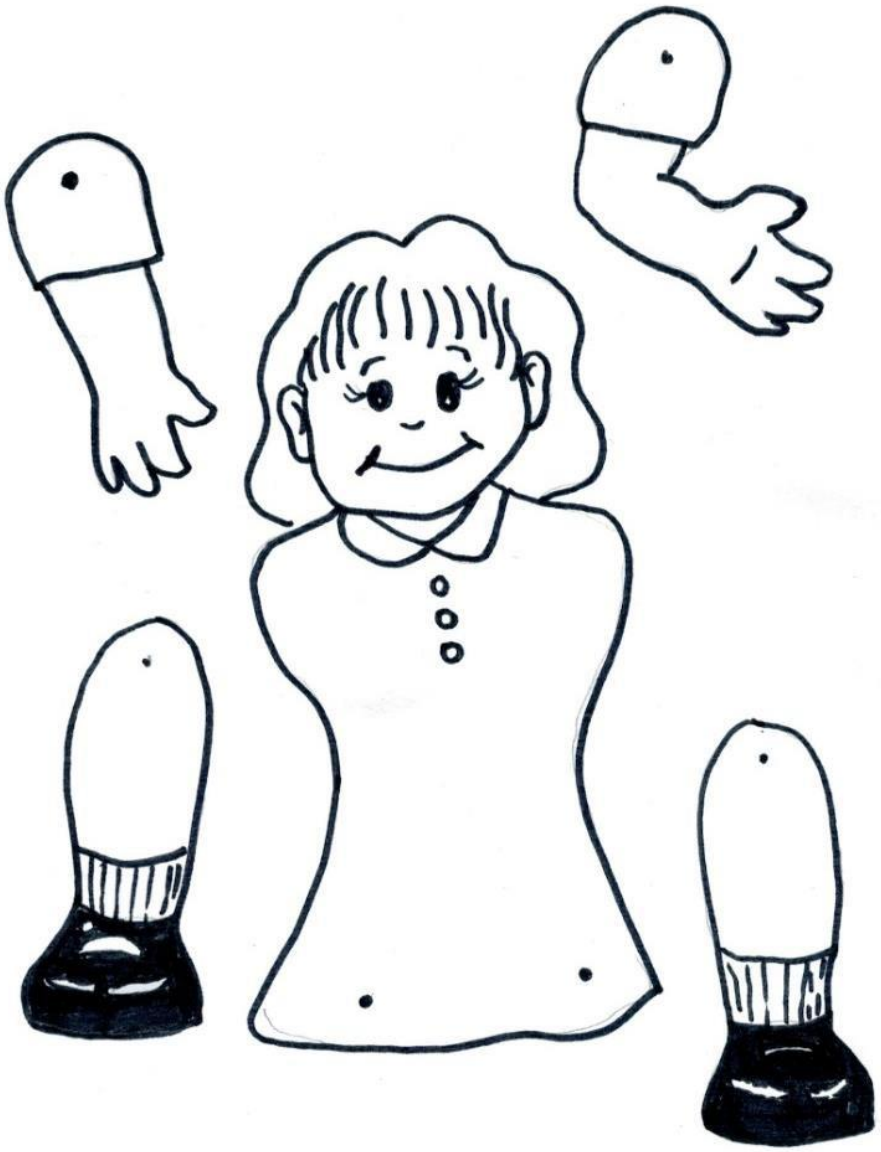
SOURCE:

- https://ders.eba.gov.tr/ders//redirectContent.jsp?resourceId=f776ebc6f3d621d4249427884624a7ba&resourceType=1&resourceLocation=2

Anne



Ann



Playful Shadows

Course Title:	Science Activity	Subject:	Light and Shadow

Cognitive Development

Gain1: Pay attention to the object/situation/event (Indicators: Focuses on the object/situation/event that needs attention. Asks questions about the object/situation/event that attracts his/her attention).

Gain 8: Compares the properties of objects or beings (Indicators: Compares the shape, size, length of objects/entities).

Outcome 10: Applies the instructions related to location in space. (Indicators: Tells the position of the object in space. Places the object in the right place according to the instruction. Takes position in space.)

Outcome 11: Measures objects. Measures with non-standard units. Tells the measurement result. Compares measurement results with predicted results).

Outcome 17: Establishes cause and effect relationship (Indicators: Tells the possible causes of an event. Tells the possible results of an event.)

Motor Development

Gain 3: Performs movements that require object control. (Indicators: Controls objects individually and in pairs.

Outcomes of Other STEM Disciplines

Outcomes of Technology Discipline

Conducts research to explain the problem identified. Defines the problem by analyzing the results obtained from research. Offers suggestions for the solution of the problem.

Preliminary preparation:

The classroom should be as dark as possible for the activity. Stay thick for this process If there is no curtain, the light can be blocked by covering the windows with cardboard. Choosing a lantern with strong light will affect the clarity of the shadows.

Family participation:

After the activity, families can be asked to play shadow play with the children by making shapes with their hands in front of the light.

1. STAGE SCENARIO: (5 - 10 min)

Ancient people followed the movement of the sun to know what time of day it was. They knew that the shadows of objects cast by the sun from sunrise to sunset

how they changed. Shadows were shorter at noon and longer in the morning and afternoon. The direction of the shadows also changed. When they realized this, they learned to measure time by following the shadows and invented the sundial.

https://ders.eba.gov.tr/ders/proxy/VCollabPlayer_v0.0.773/index.html#/main/curriculumResource?resourceID=3314d13fff86f9dfe0732fe95427edf9&resourceTypeID=3&loc=-1&showCurriculumPath=true

The teacher takes the children outside at different times to examine their shadows. First, she asks the children to pose for the sun. While the children are posed, the teacher takes a photo of the children. Then, at a different time, the children go to the places marked with chalk and pose again. The teacher photographs the children again in the same place and at the same angle as before. The teacher shows the two photographs to the children in the classroom and the differences between them are analyzed. Children discuss why the length and direction of the shadows are different. The children are told that the playful shadows appear and disappear, lengthen and shorten.

2. PHASE PROBLEM: (5 min)

The teacher asks the children various questions:

How are shadows formed?

Are our shadows always the

same?

Why and how do shadows move?

Ingredients:

- Play dough
- A4 paper,
- Felt-tip pen
- Flashlight.

3. STAGE IDEA GENERATION: (10 min)

(Ideas are generated about the problem situation. All ideas are noted. Idea by voting Determined.

The teacher gives the floor to all children.

Children's ideas about light and shadow are collected. Children are asked how they see shadows.
They are asked if they can move it and the answers are recorded.

4. STAGE PROTOTYPE CREATION: (20 min)

The design is concretized through the idea produced. (Drawing)

The shadows move according to the direction and angle of the light. We have to carefully adjust the angle and direction of the light to capture the same shadow again.

Limitations

Do not change the shape of the play dough after shaping it. The object

placed in the marked place on the paper should not be moved.

When creating shadows, the light depends on the distance and angle (how they hold the flashlight)
care must be taken.

Find the shadow closest to the first drawn shadow.

Preliminary preparation

The teacher divides the children into groups of

2. Distributes the play dough.

Course Flow

She asks the children to give the dough a shape.

After the children give the dough the shape they want, each group is given an A4 paper and a flashlight. (A mark should be placed on the bottom of the paper).

Put the play dough they shaped on the marked place under the paper is requested.

One group member holds the flashlight at an angle to the dough. The other group member quickly draws around the edges of the resulting shadow. The same exercise is carried out with the other group member.

One child holds the flashlight at an angle and distance while the other draws the shadow. In this process, children examine how the angle of incidence and distance of the light affect the shadow.

Teamwork Rubric: The Teamwork Rubric aims for the teacher to evaluate each of his/her students in the context of task, communication, sharing and behavior within his/her team within the scope of the STEM lesson.

	6-5	4-3	2-1	Score
Understanding	The learner should understand the purpose of his/her task fully understands.	The student partially understands the purpose of the task.	The student did not understand the purpose of the task.	
Group Dynamics	The student is recognized by everyone accepted and group decision of the roles defined as is aware of and applies. Discuss about the process and engage other members in order to inform are in a state of sharing. A group of their work keeps a log and important records events.	The student works diligently but is less productive because roles are not clarified. Not shared with all students.	The student, diligently did not work Roles unspecified, this so the student has not worked efficiently and sharing has not materialized. Student team friends of your work is not aware of it.	
Behavior	Student, group contributing to the debate and the team the opinions of your friends listens. Always on duty works on it. Group to make the necessary contribution provides.	The student is not willing to compromise. He/she does not give enough support to teammates who need help. did not make a useful contribution.	The student works alone. He/she has not helped or contributed to others.	
Total Score				**...../20..**

5. PHASE TRIAL: (10 min)

It is tested whether the products created comply with the given constraints.

The children shine light on the playdough again at the same angle and distance and try to create the first shadow drawn. The shadow is tested to be in the same position and size as the first shadow.

It is examined whether the shadow closest to the first shadow is created.

6. STAGE PROTOTYPE PRESENTATION: (20 min)

All groups present their products and the products are observed.

The steps of the resulting product can be videotaped or photographed.

They are asked to present the results in the classroom and share the paths followed.

7. STAGE EVALUATION: (10 min)

All groups evaluate and score the products of the other groups according to the evaluation rubric.

Social Product: General Rubric

Category.	4	3	2	1	Points Awarded
Idea Development	It is clear that existing known models and knowledge are taken into account in the product.	The idea behind the product is clear and easy to understand.	Some points in the idea of the product are not clear and need to be explained needs.	It did not take into account known models.	
BTHP Relationship	The desired criteria are emphasized and detailed information is provided. In addition, some points are above the desired level and deepening is provided.	Desired criteria were emphasized and detailed information was provided.	The desired criteria are emphasized but the information used is limited.	At BTHP all the limitations highlighted were not taken into account.	
Quality (Integrity, accuracy)	The product is correctly finished and looks attractive. The project is enriched with personal touches.	The product was completed correctly and care was taken clearly understood.	The product is complete but some details are limited in terms of care.	The product is incomplete, some parts are missing and no care has been taken.	
Use of Materials (tools, materials , mechanics, etc.)	The given materials were used correctly. The appeal and originality of the product is enhanced by small creative adaptations of the materials.	The given materials were used correctly.	The materials provided were incomplete and used in a sloppy manner.	The materials given were too limited to be sufficient to create the product.	

Authenticity	The product shows completely original thinking and creative ideas. It contains a personal touch. It is unorthodox and surprising.	The product presents some original ideas and different perspectives .	The instructions given when creating the product were used, but the product itself	The product is not original. Only the information given is repeated. No care and attention is shown,	

Category.	4	3	2	1	Points Awarded
			results of the study. It was limited in terms of attractiveness .	is an ordinary product. When creating the product, you should go beyond the not passed.	
Total points					**...../20..**

8. STAGE DEVELOPMENT: (10 min)

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

SOURCE:

- https://ders.eba.gov.tr/ders/proxy/VCollabPlayer_v0.0.773/index.html#/main/curriculumResource?resourceID=3314d13fff86f9dfe0732fe95427edf9&resourceTypeID=3&loc=-1&showCurriculumPath=true

Friendship Bridge

Course Title:	Science Activity	Subject:	Bridge Design

Cognitive Development

Gain1: Pay attention to the object/situation/event (Indicators: Focuses on the object/situation/event that needs attention. Asks questions about the object/situation/event that attracts attention. Explains the object/situation/event that attracts attention in detail.)

Gain 17: Establishes cause and effect relationships (Indicators: Tells the possible causes of an event. Tells the possible results of an event.

Outcome 19: Produces solutions to problems (Indicators: States the problem. Suggests various solutions to the problem. Selects one of the solutions. Explains the reason for the solution he/she chooses. Tries the solution he/she chooses. When he/she cannot reach the solution, he/she chooses a new solution. Suggests creative solutions to the problem).

Social-Emotional Development

Outcome 3: Expresses himself/herself in creative ways (Indicators: Expresses feelings, thoughts and dreams in original ways. Uses objects out of the ordinary. Creates products with original features.)

Outcome 4: Explains the feelings of others about an event or situation (Indicators: Expresses the feelings of others. Explains the reasons for other people's feelings.)

Outcome 7: Motivates himself/herself to accomplish a job or task (Indicators: Starts a job without adult guidance. Makes an effort to finish the work on time).

Language Development

Outcome 5: Uses language for communication (Indicators: Starts a conversation. Continues the conversation. Ends the conversation. Waits for his/her turn to speak. Expresses feelings, thoughts and dreams. Explains the reasons for their feelings and thoughts.)

Other STEM Discipline Outcomes

Engineering achievements

Ability to apply knowledge of mathematics, science and engineering.

Ability to design and conduct experiments as well as data evaluation and interpretation skills.

Ability to identify, formulate and solve engineering problems.

Outcome of Technology Discipline

Conducts research to explain the problem identified.

Offers suggestions for the solution of the problem.

Determines the general characteristics of the solution.

Plans and realizes the construction stages of the design.

Presents suggestions for changing and improving the design with justifications.

Preparation Process: 2 mountain models 30 cm high should be prepared in advance. For the bridge endurance test, a 150 gram weight can be created for each group by filling a balloon with sand.

Family Participation

Before the activity, families can be asked to do research with the children about bridges, to talk about where and why bridges are used, and to introduce two important Bosphorus bridges in our country.

1. STAGE SCENARIO: (5 min)

The teacher tells the children the story of Zuzu and Mumu, two little lambs.

Zuzu and Mumu are two sweet lambs. One at the foot of one mountain, the other at the foot of another. They look at each other and chatter away from each other. Zuzu and Mumu have become friends even though the mountains are far away. All day long, one on this mountain and the other on that mountain, they play games from far away. Sometimes whatever Zuzu did, whatever Mumu did, Mumu would do the same, and sometimes whatever Mumu sang, Zuzu would sing just like her. Their friendship continued like this for a long time. But they always wanted to graze together and play together in the river on the mountainside. The two mountains were so far away that they couldn't jump if they jumped, and they couldn't go down the sharp rocks. The two lamb friends were very sad because they were far away from each other, and every night they fell asleep dreaming that they would meet one day.

2. PHASE PROBLEM: (5 min)

Teacher to children;

Why are Zuzu and Mumu sad? Why can't

the lambs be together? What can Zuzu and

Mumu do to be reunited?

Did you pay attention to the roads that people use to cross from one mountain to another on foot or with their vehicles? (Teacher gives preliminary information about bridges to the children. Draws attention to the bridges around. Talks to the children about the bridges they have seen before).

How to build a bridge for Zuzu and Mumu's reunion using materials
I can do it.

We have to get Zuzu and Mumu to each other safely.

Ingredients:

- Thick knitting rope
- 10 straws
- 10 tongue sticks

- Cardboard
- Scissors
- Liquid and stick adhesive

- Duct tape
- 4 paper towel rolls
- Chenille
- Lamb models
- 2 mountain models
- Dough
- 20 cm skewer sticks

3. STAGE IDEA GENERATION: (15 min)

(Ideas are generated about the problem situation. All ideas are noted. The idea is determined by voting.

Preliminary Preparation

Ask the question "Who builds bridges?" and discuss the concepts of architect and engineer.

The question "What are bridges for?" can be asked and

discussed. Visuals about the important bridges of our

country can be presented.

https://www.atlasdergisi.com/kesfet/gezi/turkiyenin-10-tarihi-koprusu.html

Unusual bridges can be promoted.

https://www.nationalgeographic.com.tr/dunyanin-en-guzel-kopruleri/

Course Flow

Your lambs are asking for our help to be reunited. How can we reunite them?

Answers are received from the children and the teacher writes down the answers. Children are introduced to the materials and asked to design a structure that will bring Zuzu and Mumu together.

Materials using Zuzu and Mumu. safe one as let's bring them together.

(Zuzu and Mumu paper puppets can be used for bridge trials).

4. STAGE PROTOTYPE CREATION: (20 min)

The design is concretized through the idea produced. (Drawing)

Teacher children you guys Design engineers.
Now Using the materials at hand, we must create a design that will bring Zuzu and Mumu together.

Limitations

Our design must be safe for the lambs.

150 grams of weight (children can be made to hold it to feel the weight).

The model must reach from the top of the mountain to the top of the other mountain.

The bridge is visually in harmony with nature, like a part of the mountains. It must be.

All designengineers in the group should work in a division of labor. Duration is two hours for two days.

Preliminary Preparation

Teacher-guided;

Children are divided into groups (groups of 3-4)

The teacher clearly presents the materials for each group to the

children. Children experiment and design.

Children are given the opportunity to create a bridge that will bring the lambs together by choosing the most suitable material and technique in an original way using the materials given.

Course Flow

Each student draws his/her idea.

-Groups are checked frequently to ensure that they do not go off topic.

-The teacher walks around the groups, listens to the ideas developed by the students and observes the process. At the final idea selection stage, students are supported in selecting a feasible idea.

Product Development

Assistance is provided on the use of materials. All

students are asked to design a bridge.

Students are guided on the construction of the designed bridges.

The missing parts of the designed bridges and the parts that need to be improved are discussed and a selected example is distributed to the groups.

Children are assessed using the Teamwork Rubric

Teamwork Rubric: The Teamwork Rubric aims for the teacher to evaluate each of his/her students in the context of task, in-group communication, sharing and behavior within his/her team within the scope of the STEM lesson.

	6-5	4-3	2-1	Score
Understanding	The student fully understands the purpose of the task.	The student partially understands the purpose of the task.	The student did not understand the purpose of the task.	
Group Dynamics	The learner is aware of and implements the roles agreed upon by all and determined as a group decision. They share in order to discuss and inform other members about the process. Keep a group diary of their work and record important events.	The student works diligently but is less productive because roles are not clarified. Not shared with all students.	The student did not work diligently. Roles were not defined, so the student did not work efficiently and did not share. The student is not aware of the work of his/her teammates.	

	6-5	4-3	2-1	Score
Behavior	The learner contributes to group discussions and listens to the ideas of his/her teammates. Always works on the task. Makes the necessary contribution to group work.	The student is not willing to compromise. Did not make enough useful contributions to teammates who needed help.	The student works alone. He/she has not helped or contributed to others.	
Total Score				**...../20..**

5. PHASE TRIAL: (10 min)

It is tested whether the products created comply with the given constraints.

If the product is sufficient in terms of height, weight, width and robustness, it can be said to be successful.

If the product does not have the desired features or if there is a deficiency in the achievements, the product is reviewed and the work steps are asked to be repeated.

6. STAGE PROTOTYPE PRESENTATION: (20 min)

All groups present their products and are observed to see if they have done the given task.

The steps in the formation of the resulting product can be video recorded or photographed.

They are asked to introduce the products in the classroom and share the paths followed.

7. STAGE EVALUATION: (10 min)

The Whole groups other groups products evaluation rubric According to evaluates and scores.

The social product is tested using the general rubric. The social product can be a concrete object, algorithm, mathematical model (equation, graph) or research design (experimental setup).

Social Product: General Rubric

Category.	4	3	2	1	Points Awarded
Idea Development	It is clear that existing known models and knowledge are taken into account in the product.	The idea behind the product is clear and easy to understand.	Some points in the product idea are not clear and need clarification.	It did not take into account known models.	

Daily Problem Relation	The required criteria are emphasized and detailed information is provided. In addition, some points are above the desired level and deepening has been achieved.	Desired criteria were emphasized and detailed information was provided.	The desired criteria are emphasized but the information used is limited.	Not all the limitations highlighted in the daily problem are taken into account.	

Category.	**4**	**3**	**2**	**1**	**Points Awarded**
Quality (Integrity, integrity)	The product is correctly finished and looks attractive. The project is characterized by personal touches enriched.	The product was completed correctly and care was clearly taken It's understood.	The product is complete but some details are limited in terms of care.	The product is incomplete, some parts are missing and no care has been taken.	
Material Use (tool-equipment, materials, mechanics, etc.)	The given materials were used correctly. Product attractiveness and originality through small creative adaptations of materials enriched.	The given materials were used correctly.	The materials provided were incomplete and used in a sloppy manner.	The materials given were too limited to be sufficient to create the product.	
Authenticity	The product shows completely original thinking and creative ideas. It contains a personal touch. It is unorthodox and surprising.	The product presents some original ideas and different perspectives.	The instructions given while creating the product were used, but the product could not reveal its own results. It was limited in terms of attractiveness.	The product is not original. Only the information given is repeated. It is an ordinary product without care and attention. When creating the product, you should not go beyond the instructions given. not passed.	
Total points					**...../20..**

8. STAGE DEVELOPMENT: (10 min)

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

SOURCE:

- https://www.nationalgeographic.com.tr/dunyanin-en-guzel-kopruleri/

- https://www.atlasdergisi.com/kesfet/gezi/turkiyenin-10-tarihi-koprusu.html

Soil Neither Likes nor Dislikes

Course Title:	Science Activity	**Subject:**	Environmental Pollution

Cognitive Development

Gain1: Pay attention to the object/situation/event (Indicators: Focuses on the object/situation/event that needs attention. Asks questions about the object/situation/event that attracts attention. Explains the object/situation/event that attracts attention in detail.)

Gain 2: makes predictions about objects/situations/events (Indicators: Makes a prediction about an object/situation/event. Examines the real situation. Compares the prediction with the actual situation.)

Gain 17: Establishes cause and effect relationships (Indicators: Tells the possible causes of an event. Tells the possible results of an event.

Other STEM Discipline Outcomes

Outcome of Technology Discipline

Realizes the problems in his/her life.

Conducts research to explain the problem identified. Defines the

problem by analyzing the results obtained from research. Offers

suggestions for the solution of the problem.

Engineering achievements

Ability to apply knowledge of mathematics, science and engineering.

To have the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.

To have knowledge about the issues of our age.

Family Engagement:

At the end of the activity, families can be asked to do research with children about environmental pollution and recycling.

1. STAGE SCENARIO: (5 min)

The teacher tells the children the story of the soil.

It all started with the adventure of a small rock. It broke off from the huge mountain after a heavy rain. It started to roll rapidly. It was crumbling as it went down.

It rolled, rolled, rolled and fell into the water as a cup. A long journey began in the stream flowing through the mountains. As the rain fell, the stream accelerated,

dragging him through the water. The more he was dragged, the smaller he became in the stream. This long

At the end of the journey, you'll come to a small place where frogs sing songs and he found himself in the lake. The waves had carried him out of the water. He had gotten so small that everything around him now seemed huge. He remembered how he used to be a huge rock. As he wandered in his thoughts, he fell asleep from exhaustion. The hot sun had dried and warmed him. He slept and rested for a while. In his dream, it was as if someone was singing to him and rocking him softly. When he opened his eyes, he could not believe what he saw, because he was flying. The strong wind had taken her in its arms and was blowing her from side to side with howls. As the wind blew, the little rock became smaller and smaller. Finally the wind gently rolled it to the ground. He looked around curiously and a little alarmed, trying to figure out where he was. When he saw the deep blue sky and the tree branches greeting the clouds above him, his face relaxed with happiness. He smiled. What a magnificent view this was! Looking around, he saw thousands of beads following him. He was not alone. He was now one in the soil. He was very happy where he was, under the trees and with his friends.

2. PHASE PROBLEM: (5 min)

The teacher examines the soil in the garden with the children. The children talk about the fact that the soil is made of small grains. They are asked what else they see on the soil. The teacher tells the children that the soil is not only composed of rocks, but that there are foods that nourish and strengthen the soil and that the soil loves very much.

The teacher asks the children various questions:

What happened to the boulder that broke

off from the mountain? What did you see

when you examined the soil? How is the

soil nourished?

Does the earth eat/love everything?

Ingredients:

Pot filled with soil (as many as the

number of groups) Magnifying glass,

(as many as the number of

groups) Natural wastes such as

leaves, fruits

Plastic, glass (under the guidance of the teacher) wastes with raw materials.

3. STAGE IDEA GENERATION: (15 min)

(Ideas are generated about the problem situation. All ideas are noted. Idea by voting Determined.

After all children have been given the floor, the teacher says to the children:

The little rock told us how the soil was formed. Now our soil needs to be nourished to make it more fertile. I wonder what the soil likes / dislikes? Children's

At the end of the journey, you'll come to a small place where frogs sing songs and guesses are taken and noted down.

4. STAGE PROTOTYPE CREATION: (20 min)

The design is concretized through the idea produced. (Drawing)

Children analysts work to solve problems. Finding out what the soil likes and dislikes will help us solve the problem of environmental pollution. Today we analysts will work to find out what the soil likes and dislikes.

Limitations

Waste placed in the soil should be marked and noted on the graph.

The soil should not be stirred during the process.

Preliminary Preparation

Teacher-led

Children are divided into groups (4-5 people)

The teacher clearly presents the materials for each group to the children.

Course Flow

The children are presented with the materials and their predictions about whether or not they will be lost in the soil are taken and noted down.

The children place the selected waste materials in pots filled with soil and take a photo of each group's waste in the pots. The selected wastes are lightly covered with soil.

The selected waste is noted for each group.

At the end of 15 days, children examine the wastes they put in the soil. The children are shown the photographs of the wastes when they were first placed in the soil and are asked to compare the final versions.

Create a graph with the children for the wastes that the soil likes and dislikes.

Teamwork Rubric: The Teamwork Rubric aims for the teacher to evaluate each of his/her students in the context of task, in-group communication, sharing and behavior within his/her team within the scope of the STEM lesson.

	6-5	**4-3**	**2-1**	**Score**
Understanding	The learner fully understands the purpose of the task.	The student partially understands the purpose of the task.	The student did not understand the purpose of the task.	
Group Dynamics	Student, everyone accepted by and as a group decision defined roles is aware of and applies. Discuss about the process and other members in order to inform are in a state of sharing. A collection of his work keeps a group log and records important events.	The student, diligently works but the roles because it is not clarified fewer students efficient. All with students in a shared state It is not.	The student did not work diligently. Roles were not defined, so the student did not work efficiently and did not share. The student is not aware of the work of his/her teammates.	
	Student, group	Student, reconciliation		

Behavior	contributing to the debate and to share the ideas of their teammates. listens. Always on duty works on it. Group	is not willing. Team in need of help to your friends useful enough	Student, alone works. He has not helped others and did not contribute.	

	6-5	4-3	2-1	Score
	contributes to its work.	did not contribute.		
Total Score				**...../20..**

5. PHASE TRIAL: (10 min)

It is tested whether the products created comply with the given constraints.

Prediction results and actual results are compared.

6. STAGE PROTOTYPE PRESENTATION: (20 min)

All groups present their products and discuss the waste that is and is not lost in the soil.

The steps in the formation of the result can be videotaped or photographed.

Introduce the result in the class and share the paths followed

7. STAGE EVALUATION: (10 min)

The Whole groups other groups products evaluation rubric evaluates and scores them accordingly.

The social product can be a concrete object, algorithm, mathematical model (equation, graph) or research design (experimental setup).

Social Product: General Rubric

Category.	4	3	2	1	Points Awarded
Idea Development	It is clear that existing known models and knowledge are taken into account in the product.	The idea behind the product is clear and easy to understand.	Some points in the idea of the product are not clear and need to be explained needs.	It did not take into account known models.	
Daily Problem Relation	The desired criteria are emphasized and detailed information is provided. In addition, some points are above the desired level and deepening provided.	Desired criteria were emphasized and detailed information was provided.	The desired criteria are emphasized but the information used is limited.	All the limitations emphasized in the daily problem relationship are not taken into account.	
Quality (Integrity, integrity)	The product is correctly finished and looks attractive. The project is enriched with personal touches.	The product was completed correctly and care was clearly taken It's understood.	The product is complete but some details are limited in terms of care.	The product is incomplete, some parts are missing and no care has been taken.	

Material Use (tool-paraphernalia,	The given materials were used correctly. Small in materials	The given materials are used in a correct	The materials provided are incomplete and sloppy	The materials given are sufficient to create the product	

Category.	**4**	**3**	**2**	**1**	**Points Awarded**
material, mechanical etc.)	product attractiveness and originality through creative adaptations enriched.	used in such a way.	used in such a way.	to the extent that it would not have been possible to do so.	
Authenticity	The product shows a completely original thought and creative idea. It contains a personal touch. It is unorthodox and surprising.	The product presents some original ideas and different perspectives.	The instructions given while creating the product were used, but the product could not reveal its own results. It was limited in terms of attractiveness.	The product is not original. Only the information given is repeated. It is an ordinary product without care and attention. When creating the product, you should not go beyond the instructions given. not passed.	
Total points					**...../20..**

8. STAGE DEVELOPMENT: (10 min)

Improves the parts of the presentation and evaluation of his/her work that he/she thinks he/she is missing or needs to correct.

Bird's Eye View

Course Title:	Science Activity	**Subject:**	Bird's Eye View
Author:	Irem Özer		

Cognitive Development

Gain 2: Makes predictions about an object/situation/event (Indicators: Makes a prediction about the object/situation/event. Examines the real situation. Compares the prediction with the actual situation.)

Gain 5: Observes objects or beings (Indicators: Tells the name, color, shape, size, length of the object/entity).

Outcome 10: Applies the instructions related to location in space. (Indicators: Tells the location of the object in space. Uses maps and sketches).

Social-Emotional Development

Outcome 7: Motivates himself/herself to accomplish a job or task (Indicators: Starts a job without adult guidance. Makes an effort to finish the work on time).

Motor Development

Gain 4: Performs movements that require the use of small muscles (Holds the pencil correctly, controls the pencil, draws the lines in the desired quality).

Language Development

Outcome 6: Develops vocabulary (Indicators: Recognizes new words in listening and asks the meaning of the words. Remembers the words and tells the meaning of the words. Uses newly learned words in accordance with their meanings.)

Other STEM Discipline Outcomes

Engineering achievements

Ability to apply knowledge of mathematics, science and engineering.

Ability to identify, formulate and solve engineering problems.

Outcome of Technology Discipline

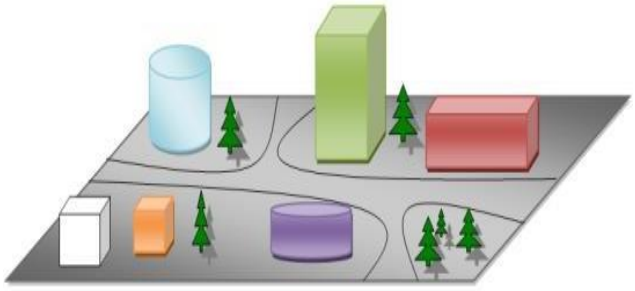
Realizes the problems in his/her life.

Conducts research to explain the problem identified.

Offers suggestions for the solution of the problem.

Identifies the general characteristics of the solution.

Preliminary Preparation:
Teacher before the activity age group and children development level appropriate en less 3 create a mock-up of the location of the object. Representative structures on the model to facilitate the perception of location and should be selected in different colors and shapes to assess its correct positioning.



Family Participation: After the activity, families can be asked to create a sketch of the area where they live with their children. In order to determine the accuracy of the created sketch, a road finding activity can be done by following the sketch.

1. STAGE SCENARIO: (5 min)

Irem and her family moved to a new neighborhood where they had lived for years. Although she has a hard time getting used to her new surroundings, she loves her new school and her friends. But she has a small problem. Whenever she wants to go to school, to the grocery store or to her friend's house, she gets lost and can't figure out where to turn and how to get there. She was even late for her favorite activity at school because of this and missed her favorite friend's birthday.

2. PHASE PROBLEM: (5- 10 min)

Irem wants our help to get to know her new neighborhood so that she doesn't get lost on her way to the market, to school or to a friend. Let's create a sketch to solve this problem.

The teacher shows examples of maps to the children. Presents large-scale and small-scale maps and sketches for children to examine. The teacher talks about what we use maps for. The teacher asks children how maps are drawn and asks for their guesses.

Ingredients

- Types of sketches/maps for review
- Neighborhood/neighborhood model
- Paper
- Crayons
- Chair

3. STAGE IDEA GENERATION: (20 min)

(Ideas are generated about the problem situation. All ideas are noted. Idea by voting Determined.

Preliminary Preparation: Examples of maps and sketches are brought to the class and examined by the children
is asked. Photographs of a bird's eye view of the city they live in are brought to the classroom and examined.

Course Flow

Teacher: What do we use

maps for?

How do houses, parks or cities look on maps?

https://www.cnnturk.com/fotogaleri/dunya/diger-haberler/dunyadan-25-sehrin-kusbakisi-gorunumu?page=9

How do birds see us from above?

He/she asks questions. Receives answers from all children. If there are children who have seen down from a high place or boarded an airplane, they are asked to share what they saw with their friends.

The teacher talks to the children about what a bird's eye view is and how to

draw it. Click on the link for children to experience the bird's eye view.

https://ders.eba.gov.tr/ders/proxy/VCollabPlayer_v0.0.757/index.html#/main/curriculumResource?resourceID=f9eaff96511e379ebbbad6296dd4a128&resourceTypeeID=3&loc=-1&showCurriculumPath=true

Under the guidance of the teacher, children examine the toys or materials they have chosen and are asked to draw their appearance at eye level. Then, with the help of the teacher, children are asked to look at the toy or material they have chosen from a chair. A bird's eye view of the material is drawn next to their first drawing. The reasons for the differences between the drawings are discussed with the children.

4. STAGE PROTOTYPE CREATION: (20 min)

The design is concretized through the idea produced. (Drawing)

Limitations:

Roads and buildings should be positioned according to

the model. Drawings should be painted in colors

suitable for the model.

Draw a bird's eye view of the right material in the right position, regardless of size is required.

Professions Cartographer

Preliminary Preparation: The model is brought to the classroom and children are asked to examine it. It is ensured that the model, which is safely on the floor, can be seen from the chair. Children are divided into groups of two. The teacher presents the materials openly to the children.

Lesson Flow: Under the guidance of the teacher, children stand on the chair and examine the model created by the teacher (it can be made of building toys, blocks, rolls, cardboard boxes). The children are asked questions such as what is where, what is next to it, what is standing in front of it and chat about the position of the objects on the model.

Children are asked to use the right material, regardless of its size, in this area. They are asked to draw a bird's eye view of the location.

Each child draws the model from a bird's eye view.

Product Development: Help with the use of materials. Each group is asked to

draw a sketch. Children are evaluated using the Teamwork Rubric

Teamwork Rubric: The Teamwork Rubric aims for the teacher to evaluate each of his/her students in the context of task, in-group communication, sharing and behavior within his/her team within the scope of the STEM lesson.

	6-5	4-3	2-1	Score
Understanding	The student fully understands the purpose of the task.	The learner partially understands the purpose of the task.	The student did not understand the purpose of the task.	
Group Dynamics	Student, everyone accepted by and as a group decision defined roles is aware of and applies. Discuss about the process and other members in order to inform are in a state of sharing. A collection of his work keeps a group log and records important events.	The student, diligently works but the roles because it is not clarified fewer students efficient. All with students in a shared state It is not.	The student did not work diligently. Roles were not defined, so the student did not work efficiently and did not share. The student is not aware of the work of his/her teammates.	
Behavior	Student, group contributing to the debate and the team the opinions of your friends listens. Always on duty works on it. Group to work contributes.	Student, willing to compromise is not Help the team that needs to your friends useful enough contribution did not.	The student works alone. He/she has not helped or contributed to others.	
Total Score				**...../20..**

5. PHASE TRIAL: (10 min)

Drawings are tested. It is tested whether the products created comply with the given limitations. If the product does not have the desired features or if there is a deficiency in the gains, the product is reviewed and the study steps are asked to be repeated.

6. STAGE PROTOTYPE PRESENTATION: (20 min)

The drawings are presented and it is discussed whether the drawings have the desired characteristics. The drawings are exchanged among the children to see if different drawings achieve the same result. The steps in the formation of the product can be video recorded or photographed. The products are asked to be introduced in the classroom and the paths followed are shared.

7. STAGE EVALUATION: (10 min)

All groups evaluate and score other groups' products according to the evaluation rubric. The social product can be a concrete object, algorithm, mathematical model (equation, graph) or research design (experimental setup).

Social Product: General Rubric

Category.	4	3	2	1	Points Awarded
Idea Development	Incorporation of existing known models and knowledge into the product is clearly taken into account.	The idea behind the product is clear and easy to understand.	Some points in the idea in the product are not clear and needs to be explained.	It did not take into account known models.	
Daily Problem Relation	The required criteria are emphasized and detailed information is provided. In addition, some points are above the required level and deepening has been achieved.	Desired criteria were emphasized and detailed information was provided.	The desired criteria are emphasized but the information used is limited.	Not all the limitations highlighted have been taken into account.	
Quality (Integrity, accuracy)	The product is correctly finished and looks attractive. The project is enriched with personal touches.	The product was completed correctly and care was clearly taken It's understood.	The product is complete but some details are limited in terms of care.	The product is incomplete, some parts are missing and no care has been taken.	
Use of Materials (tools, materials , mechanics, etc.)	The given materials were used correctly. Product attractiveness and originality through small creative adaptations of materials enriched.	The given materials were used correctly.	The materials provided were incomplete and used in a sloppy manner.	The materials given were too limited to be sufficient to create the product.	
Authenticity	The product shows a completely original thought and creative idea. It contains a personal touch. It is unorthodox and surprising.	The product presents some original ideas and different perspectives .	The instructions given while creating the product were used, but the product could not reveal its own results. It was limited in terms of attractiveness.	The product is not original. Only the information given is repeated. It is an ordinary product without care and attention. When creating the product, you should not go beyond the instructions given. not passed.	
Total points					**...../20..**

8. **STAGE DEVELOPMENT: (10 min)** Improves the parts of the presentation and evaluation of his/her work that he/she thinks he/she is missing or needs to correct.

SOURCE:

- https://www.cnnturk.com/fotogaleri/dunya/diger-haberler/dunyadan-25-sehrin-kusbakisi-gorunumu?page=9
- https://ders.eba.gov.tr/ders/proxy/VCollabPlayer_v0.0.757/index.html#/main/curriculumResource?resourceID=f9eaff96511e379ebbbad6296dd4a128&resourceTypeID=3&loc=-1&showCurriculumPath=true

Disappearing Toys

Course Title:	Science Activity	**Subject:**	Disappearing Toys
Author:	Kevser Sari		

Cognitive Development

Gain1: Pay attention to the object/situation/event (Indicators: Focuses on the object/situation/event that needs attention. Asks questions about the object/situation/event that attracts attention. Explains the object/situation/event that attracts attention in detail.)

Gain 2: Makes predictions about objects/situations/events (Indicators: Says his/her guess about the object/situation/event. Explains the clues related to his/her prediction. Examines the real situation. Compares the prediction with the actual situation.)

Gain 4: Counts objects (Indicators: Counts rhythmically one by one forward/backward. Shows the specified number of objects. Says how many objects he/she counts).

Social-Emotional Development

Outcome 3: Expresses himself/herself in creative ways (Indicators: Expresses feelings, thoughts and dreams in original ways. Creates products with original features.)

Outcome 15: Confidence (Indicators: Expresses himself/herself in front of the group. Expresses different opinions when necessary. Assumes leadership when necessary.)

Language Development

Outcome 5: Uses language for communication (Indicators: Makes eye contact during the conversation. Starts a conversation. Continues the conversation. Ends the conversation. Waits for his/her turn to speak. Expresses feelings, thoughts and dreams.)

Outcome 6: Develops vocabulary (Indicators: Recognizes new words in listening and asks the meaning of the words. Recalls words and tells the meaning of words. Uses words with antonyms.)

Acquisitions belonging to STEM discipline

Science Outcomes: Predicts changes in repulsion and attraction at different or the same poles of a magnet.

Technology Outcomes: Recognizes the problems in his/her life. Offers suggestions for the solution of the problem. Develops a draft design proposal for the solution. Explains the construction picture of the design to the illustrator. Plans and realizes the construction stages of the design.

1. STAGE SCENARIO: (10 min)

The teacher shows videos about magnets to the children.

https://ders.eba.gov.tr/ders/proxy/VCollabPlayer_v0.0.756/index.html#/main/curriculumResource?resourceID=380f058dc005ac2b2c6194350a79efd3&resourceTypeID=3&loc=10&showCurriculumPath=false

https://ders.eba.gov.tr/ders/proxy/VCollabPlayer_v0.0.756/index.html#/main/curriculumResource?resourceID=f0aa802094c436fea73c8da0ca4df369&resourceTypeID=3&loc=10&showCurriculumPath=false

The teacher then tells the children that she is going to tell them a story called "Disappearing Toys".

Ali woke up as he did every morning, washed his face and hands and had breakfast. After breakfast, he went to his room jumping up and down with excitement. He grabbed his favorite toy, his little teddy bear, and started to play. But what a surprise! His toy was not where he put it. He sat down and started to think. "Where is my toy? Where did I leave my toy last time?"

2. PHASE PROBLEM: (15 min)

The teacher asks the children various

questions: Why can't Ali find his toy?

Children, has anyone ever lost their favorite toy? How did you

feel when you lost your toy?

What did you do to find your toy?

What can Ali do to find his toy? How can we find toys

using magnets?

Ingredients:

- Magnets
- Cold liquid silicone,
- Metal block(Metal block at home refrigerator can be used instead),
- Long wooden stick

3. STAGE IDEA GENERATION: (15 min.)

Ideas are generated about the problem situation. All ideas are

noted down. After all children have been given the floor, the teacher

says to the children:

"How can we help Ali to find his toy and not lose it again?". The answers from the children are written down. Then the children are shown the materials and asked to design a product that will enable them to find lost toys with these materials.

"Let's use magnets to make a tool for Ali to find his toys."

STAGE 4 PROTOTOTYPE CREATION: (30

The design is concretized through the idea produced. (Drawing)

Making the Design: Students talk about the products they designed and what they learned during the activity.

The teacher gives the materials to the children. The teacher divides the children into small groups of three and says, "Now you will be a painter, a researcher and an engineer and I will tell you the tasks that your roles do. Then you can choose the role you want for yourself. The teacher guides the children to design the toy finder by experimenting. Designed products are tested.

Painter: An artist who paints.

Researcher A person who conducts research and studies.

Engineer: A person with a certain education who specializes in technical and social fields such as roads, bridges, airplanes, automobiles, construction machinery, etc. based on meeting all kinds of needs of people.(TDK)

5. PHASE TRIAL: (25 min)

The prototype is tested and its operation and functioning are checked. Corrections are made if necessary. The contribution of the product they designed to the solution of the problem is discussed and the similarities/differences between the designs are examined.

6. STAGE PROTOTYPE PRESENTATION: (20 min)

All groups present their products and are observed to see if they have done the given task. Students can improve their designs if needed.

7. STAGE EVALUATION: (15 min)

Checklist Each child is given a checklist. Children are asked to color the star under "smiley face" if the answer is "yes" and the star under "sad face" if the answer is "no".

	☺	☹
Does it match the product design?	☆	☆
Does the product work?	☆	☆
Does the product meet the need?	☆	☆

Social Product Teamwork Rubric

	6-5	4-3	2-1	Score
Understanding	The learner should understand the purpose of his/her task understands completely.	The student partially understands the purpose of the task.	The student did not understand the purpose of the task.	
Group Dynamics	The learner is aware of and implements the roles agreed upon by all and determined as a group decision. They share in order to discuss and inform other members about the process. Keep a group diary of their work and record important events.	The student works diligently but is less productive because roles are not clarified. Not shared with all students.	The student did not work diligently. Roles were not defined, so the student did not work efficiently and did not share. The student is not aware of the work of his/her teammates.	
Behavior	The learner contributes to group discussions and listens to the ideas of his/her teammates. Always works on the task. Participates in group work to make the necessary contribution.	The student is not willing to compromise. He/she did not make enough useful contributions to his/her teammates who needed help.	The student works alone. He/she has not helped or contributed to others.	
Total				**...../18**

Social Product: General Rubric: The social product can be a concrete object, algorithm, mathematical model (equation, graph) or research design (experimental setup).

Category.	**4**	**3**	**2**	**1**	**Points Awarded**

Social Product Teamwork Rubric

Idea Development	It is clear that existing known models and knowledge are taken into account in the product.	The idea behind the product is clear and easy to understand.	Some points in the product idea are not clear and need clarification.	It did not take into account known models.	
Scenario Relationship	The required criteria are emphasized and detailed information is provided. This	The desired criteria were emphasized and	The desired criteria are emphasized but	All the limitations emphasized in the script	

Category.	4	3	2	1	Points Awarded
	Besides, some points are above the desired level and deepening provided.	detailed information has been provided.	The information used is limited.	Consideration not taken.	
Quality (Integrity, accuracy)	The product is correctly finished and looks attractive. The project is characterized by personal touches enriched.	The product has been completed correctly and it is clear that care has been taken.	The product is complete but some details are limited in terms of care.	The product is incomplete, some parts are missing and no care has been taken.	
Use of Materials (tools, materials , mechanics, etc.)	The given materials were used correctly. The appeal and originality of the product is enhanced by small creative adaptations of the materials.	The given materials were used correctly.	The materials provided were incomplete and used in a sloppy manner.	The materials given were too limited to be sufficient to create the product.	
Authenticity	The product shows a completely original thought and creative idea. It contains a personal touch. It is unusual and surprising.	The product presents some original ideas and different perspectives .	The instructions given while creating the product were used, but the product could not produce its own results. In the context of attractiveness limited.	The product is not original. Only the information given is repeated. No care is taken to the product. It is an ordinary product. The product does not go beyond the instructions given when creating the product. not passed.	
Total points					**...../20**

8. STAGE DEVELOPMENT:

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

SOURCE:

- https://www.eba.gov.tr/
- https://sozluk.gov.tr/

Clean Hands

Course Title:	Science Activity	Subject:	Health and Sanitation

Cognitive Development

Gain1: Pay attention to the object/situation/event (Indicators: Asks questions about the object/situation/event that attracts his/her attention. Explains the object/situation/event that attracts his/her attention in detail.)

Gain 2: Makes predictions about objects/situations/events (Indicators: Says his/her prediction about the object/situation/event. Examines the real situation. Compares the prediction with the actual situation.)

Outcome 10: Applies the instructions related to location in space. (Indicators: Tells the position of the object in space. Places the object in the right place in accordance with the instruction).

Outcome 16: Performs simple addition and subtraction operations using objects. (Indicators: Adds the specified number of objects to the object group. Separates the specified number of objects from the object group).

Outcome 19: Produces solutions to problem situations (Indicators: States the problem. Suggests various solutions to the problem. Selects one of the solutions. Explains the reason for the solution he/she chooses. Tries the solution he/she chooses.)

Social-Emotional Development

Outcome 3: Expresses himself/herself in creative ways (Indicators: Expresses feelings, thoughts and dreams in original ways. Uses objects out of the ordinary. Creates products with original features.)

Outcome 15: Confidence (Indicators: Expresses himself/herself in front of the group. Expresses different opinions when necessary. Assumes leadership when necessary.)

Motor development

Gain 4: Performs movements that require the use of small muscles (Indicators: Glues materials.)

Self-care skills

Outcome 1: Applies the rules of cleanliness related to his/her body (Indicators: Hands, face washes).

Language Development

Outcome 5: Uses language for communication (Indicators: Makes eye contact during the conversation. Starts a conversation. Continues the conversation. Ends the conversation. Waits for his/her turn to speak. Expresses feelings, thoughts and dreams. Gives reasons for his/her feelings and thoughts).

STEM discipline outcomes

Technology Gains:

Recognizes the problems in his/her life.

Offers suggestions for the solution of the

problem.

Develops a draft design proposal for a solution.

Explains the construction drawing of the

design.

Plans and realizes the construction stages of the

design. Determines the criteria for the evaluation of

the design. Evaluates the design according to the

general features determined. ***Engineering Gains:***

To develop the techniques, skills and modern engineering knowledge required for engineering practice
ability to use tools.

1. **STAGE SCENARIO: (10 min)**

The teacher tells the children that she is going to tell a story called "Selim is washing his hands".

"When Selim came home from school, he put on his pajamas and went straight to bed and fell asleep. When it was time for dinner, his mother called Selim but he felt very weak and could not get out of bed. His mother came to Selim and took his temperature. Selim's fever was high, so Selim was sick. He and his mother went to the doctor. The doctor cured Selim. Then he told him one by one what he should do to avoid getting sick. Selim thanked the doctor. When they got home, he immediately ran to the sink to wash his hands, but what was that? Selim was too tall for the sink."

2. PHASE PROBLEM: (10 min)

The teacher asks the children various questions:

- Why could Selim have been sick?

- What should we do to avoid getting sick?

- Why did Selim find it difficult to wash his hands?

-Would you like to design a product so that Selim can wash his hands easily?

Ingredients:

- Pet Water Bottles with Cut Bottom,
- Duct Tape
- Ribbon

3. STAGE IDEA GENERATION: (15 min)

- Leğen,
- Wooden Rod

Ideas are generated about the problem situation. All ideas are noted down.

Children all of them promise right after being given
Then, Teacher by showing the children the ingredients;

"What can we produce with the materials we have so that Selim can wash his hands easily?". The answers from the children are written on the board. "Let's produce a product that will enable Selim to wash his hands using pet bottles."

4. STAGE PROTOTYPE CREATION (40 min)

The design is concretized through the idea produced. (Drawing)

The teacher gives the materials to the children. The teacher divides the children into small groups of three and says, "Now you will be a painter, a researcher and an engineer, and I will tell you the tasks that your roles do. Then you can choose the role you want for yourself. First, the children design products that will make hand washing easier by experimenting and the teacher guides them in this process. Designed products are tested.

Making the Design: Students talk about the products they designed and what they learned during the activity.

Painter: An artist who paints.

Researcher A person who conducts research and studies.

Engineer: A person with a certain education who specializes in technical and social fields such as roads, bridges, airplanes, automobiles, construction machinery, etc. based on meeting all kinds of needs of people.(TDK)

5. PHASE TRIAL(40 mins)

The prototype is tested and its operation and functioning are checked. Corrections are made if necessary. The contribution of the product they designed to the solution of the problem is discussed and the similarities/differences between the designs are examined.

6. STAGE PROTOTYPE PRESENTATION (30 min)

All groups present their products and are observed to see if they have done the given task. Students can improve their designs if needed.

7. STAGE EVALUATION: (15 min)

Checklist Each child is given a checklist. Children are asked to color the star under "smiley face" if the answer is "yes" and the star under "sad face" if the answer is "no".

	☺	☹
Does it match the product design?	☆	☆
Does the product work?	☆	☆

Does the product meet the need?		

Social Product Teamwork Rubric

	6-5	4-3	2-1	Score
Understanding	The student fully understands the purpose of the task.	The learner partially understands the purpose of the task.	The student did not understand the purpose of the task.	
Group Dynamics	The learner is aware of and implements the roles agreed upon by all and determined as a group decision. They share in order to discuss and inform other members about the process. Keeps a group diary of his/her work and records important events. records it.	The student works diligently but is less productive because roles are not clarified. Not shared with all students.	The student did not work diligently. Roles were not defined, so the student did not work efficiently and did not share. The student is not aware of the work of his/her teammates.	
Behavior	The learner contributes to group discussions and listens to the ideas of his/her teammates. Always works on the task. Need for group work contributes.	The student is not willing to compromise. Did not make enough useful contributions to teammates who needed help.	The student works alone. He/she has not helped or contributed to others.	
Total				**...../18**

Social Product: General Rubric Social product concrete object, algorithm, mathematical model (equation, graph) or research design (experimental setup).

Category.	4	3	2	1	Points Awarded
Idea Development	It is clear that existing known models and knowledge are taken into account in the product.	The idea behind the product is clear and easy to understand.	Some points in the product idea are not clear and need clarification.	It did not take into account known models.	
Scenario Relationship	The desired criteria are emphasized and detailed information is provided. In addition, some points are above the desired level and deepening provided.	Desired criteria were emphasized and detailed information was provided.	The desired criteria are emphasized but the information used is limited.	All the limitations highlighted in the script were not taken into account.	

Quality (Integrity, integrity)	The product is correctly finished and looks attractive. The project is a personal	The product was completed correctly and care was taken	The product is complete but some details need attention	The product is incomplete, some parts are missing and no care has been taken.	

Category.	**4**	**3**	**2**	**1**	**Points Awarded**
	with touches enriched.	clearly Understood.	In the context of limited.		
Material Use (tool-equipment, materials, mechanics, etc.)	The given materials were used correctly. The appeal and originality of the product is enhanced by small creative adaptations of the materials.	The given materials were used correctly.	The materials provided were incomplete and used in a sloppy manner.	The materials given were too limited to be sufficient to create the product.	
Authenticity	The product shows completely original thinking and creative ideas. It contains a personal touch. It is unorthodox and surprising.	The product presents some original ideas and different perspectives .	The instructions given while creating the product were used, but the product could not reveal its own results. It was limited in terms of attractiveness.	The product is not original. Only the information given is repeated. No care was taken with the product, it is an ordinary product. The product does not go beyond the instructions given when creating the product. not passed.	
Total points					**...../20**

8. STAGE DEVELOPMENT (10 mins)

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

SOURCE

- https://sozluk.gov.tr/

Cat Food Container

Course Title:	Science and Nature	Subject:	Integrated Group Activity

Cognitive Development Gains

Gain 1: Pay attention to the object/situation/event (Indicators: Focuses on the object/situation/event that needs attention. Asks questions about the object/situation/event that attracts attention. Explains the object/situation/event that attracts attention in detail.)

Gain 2: Makes predictions about objects/situations/events (Indicators: Says his/her guess about the object/situation/event. Explains the clues related to his/her prediction. Examines the real situation. Compares the prediction with the actual situation.)

Gain 5: Observes objects or beings (Indicators: Tells the name, color, shape, size, length, texture, sound, smell, material, taste, amount and intended use of the object/asset).

Motor Development Gains

Gain 4: Performs movements that require the use of small muscles. (Indicators: Arranges objects on top of each other / side by side / inside each other. Brings objects together to form new shapes. Glues materials. Shapes materials using tools.)

Language Development Outcomes

Gain 7: Understands the meaning of what he/she listens/watches. (Indicators: Fulfills verbal instructions. Explains what he/she listens/watches. Makes comments about what he/she listens/watches.)

Social - Emotional Development Outcomes

Outcome 15: Confidence (Indicators: Expresses himself/herself in front of the group. Expresses different opinions when necessary.)

Other STEM Discipline Outcomes:

-Defines the basic processes needed for a project.

-Planning, prototyping, design, execution, quality control and reporting explains the stages.

-Develop, test and refine prototypes as part of an iterative design process.

-Contributes to the ecosystem by creating new products.

-Encourages students to think with flexibility and confidence.

Enables design-oriented thinking and innovation.

Social Product Outcomes:

-The child gains the ability to design and present products.

-The child gains the skills of public speaking, c o m m u n i c a t i o n , s e l f - e x p r e s s i o n , and assuming leadership when necessary.

1. STAGE SCENARIO: (15 min)

Children talk about Animal Protection Day on October 4. Children are asked whether they keep animals at home and which animals they would like to keep. The school garden is visited with the children. During the tour, children are told that they should pay attention to the things they see in the school garden. Then they go to the classroom and ask some questions to the children in the classroom.

-What did you see in the garden?

-What creatures did you see in the garden?

-Do you know how cats eat?

-What can we do to make it easier for cats to feed?

2. PHASE PROBLEM: (5 min)

First of all, talk about the types of living things we can see outside. They are asked which foods cats are fed with. Children are given the right to speak about how to feed cats. The materials are shown to the children and they are asked how we can make a food bowl with the help of these materials. The children are then given paper and crayons and asked to put their imaginary designs on paper.

Ingredients:

- Abeslang
- Silicone
- Silicone gun
- Finger paint
- Cat food

3. STAGE IDEA GENERATION: (15 min)

(Ideas are generated about the problem situation. All ideas are noted. Idea by voting is determined.)

After all children have been given the right to speak, the teacher asks:

"What can we do to make it easier for cats to eat?". The answers from the

children are noted down.

The children are then presented with materials and asked to design a food bowl with these materials.

4. STAGE PROTOTYPE CREATION: (20 min)

The design is concretized through the idea produced. (Drawing)]

Children are given the opportunity to dye the abesangles in specific colors. Silicone groups are guided for safer use of the gun.

Children are given the opportunity to create a more aesthetic work by using a certain color pattern while making the food bowl.

Wait for the made food containers to dry.

Social Product Teamwork Rubric

	6-5	4-3	2-1	Score
Understanding	The learner fully understands the purpose of the task. moments.	The learner partially understands the purpose of his/her task moments.	The student did not understand the purpose of the task.	
Group Dynamics	The learner is aware of and implements the roles agreed upon by all and determined as a group decision. They share in order to discuss and inform other members about the process. Keep a group diary of their work and keep important records events.	The student works diligently but is less productive because roles are not clarified. Not shared with all students.	The student did not work diligently. Roles were not defined, so the student did not work efficiently and did not share. The student is not aware of the work of his/her teammates.	
Behavior	The learner contributes to group discussions and listens to the ideas of his/her teammates. Always works on the task. Need for group work contributes.	The student is not willing to compromise. He/she did not make enough useful contributions to his/her teammates who needed help.	The student works alone. He/she has not helped or contributed to others.	
Total Score				**...../ 18**

5. PHASE TRIAL: (10 min)

The prototype is tested and its operation and functioning are checked. Corrections if necessary

It is done.

A sufficient amount of cat food is poured into the created food containers and placed on the floor.

The children go outside with the children to identify the food containers. Children place their food containers in different

and observe how the cats are fed from the containers.

6. STAGE PROTOTYPE PRESENTATION: (20 min) (

All groups present products)

The contribution of the food bowls they designed to the solution of the problem of cats not being fed is discussed and the similarities/differences between the designs are examined.

7. STAGE EVALUATION: [(10 min)

The Whole rubric	groups evaluates and	other scores	groups accordingly].	products	evaluation

Social Product: The product is evaluated using the General Rubric.

Social Product: General Rubric: Social product concrete object, algorithm, mathematical model (equation, graph) or research design (experimental setup).

Category.	4	3	2	1	Points Awarded
Idea Development	It is clear that existing known models and knowledge are taken into account in the product.	The idea behind the product is clear and easy to understand.	Some points in the idea of the product are not clear and need clarification he hears.	It did not take into account known models.	
Scenario Relationship	The desired criteria are emphasized and detailed information is provided. In addition, some points are above the desired level and deepening provided.	Desired criteria were emphasized and detailed information was provided.	The desired criteria are emphasized but the information used is limited.	All the limitations emphasized in the script were not taken into account.	
Quality (Integrity, integrity)	The product is correctly finished and looks attractive. The project is characterized by personal touches enriched.	The product was completed correctly and care was clearly taken It's understood.	The product is complete but some details are limited in terms of care.	The product is incomplete, some parts are missing and no care has been taken.	
Material Use (tool-equipment, materials, mechanics, etc.)	The given materials were used correctly. Product attractiveness and originality through small creative adaptations of materials enriched.	The given materials were used correctly.	The materials provided were incomplete and used in a sloppy manner.	The materials given were too limited to be sufficient to create the product.	
Authenticity	The product shows completely original thinking and creative ideas. It contains a personal touch. It is unorthodox and surprising.	The product presents some original ideas and different perspectives.	The instructions given while creating the product were used, but the product did not produce its own results. Attractiveness limited in context.	The product is not original. Only the information given is repeated. It is an ordinary product without care and attention. The instructions given when creating the product and has not gone beyond that.	
Total points					**...../20**

Checklist Each child is given a checklist. Children are asked to evaluate the containers they made. If the answer is "yes", they are asked to color the star under "smiley face"; if the answer is "no", they are asked to color the star under "sad face".

	☺	☹
It was easy to make.	☆	☆
The cats were able to eat.	☆	☆
It was sturdy and useful.	☆	☆

8. STAGE DEVELOPMENT: (10 min)

Children compare the food containers they have made with the food containers made by their friends and may see deficiencies in their products. The teacher gives children the opportunity to improve their products by using supportive expressions.

Garbage Hunter

Course Title:	Science, Mathematics	Subject:	Integrated Science, Mathematics, Game Activity

Gains in Cognitive Development:

Gain1: Pay attention to the object/situation/event (Indicators: Focuses on the object/situation/event that needs attention. Asks questions about the object/situation/event that attracts attention. Explains the object/situation/event that attracts attention in detail.)

Gain 2: Makes predictions about the object/situation/event (Indicators: Gives clues about the object/situation/event. Makes a prediction by combining the clues).

Outcome 17: Establishes cause-effect relationships (Indicators: Tells the possible causes of an event. Tells the possible results of an event.)

Language Development Outcomes:

Gain 7: Understands the meaning of what he/she listens/watches. (Indicators: Fulfills verbal instructions. Explains what he/she listens/watches. Makes comments about what he/she listens/watches.)

Social Emotional Development:

Outcome 3: Expresses himself/herself in creative ways (Indicators: Expresses feelings, thoughts and dreams in original ways. Uses objects out of the ordinary. Creates products with original features.)

Outcome 7: Motivates himself/herself to accomplish a job or task (Indicators: Shows effort to finish what he/she has started on time).

Motor Development Gains:

Gain 4: Performs movements that require the use of small muscles (Indicators: Drains objects from container to container. Cuts materials. Glues the materials).

Other STEM Discipline Outcomes:

Outcome 1: Ability to apply mathematics, science and engineering knowledge.

Outcome 3: Ability to design a system, component or process to meet specific requirements within realistic constraints (economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability).

Outcome 5: Identify, formulate and solve engineering problems skill.

Outcome 6: Understanding of professional and ethical responsibility.

Outcome 7: Ability to communicate effectively.

Social Product Outcomes:

The ability to present the child's product in front of the community. Ability to work in a team.

Designing according to the instruction.

1. STAGE SCENARIO: (5 min)

The teacher tells the children that she is going to tell a story called "Tuna the Garbage Hunter". It was Tuna's first vacation with his family. He was going to see the sea for the first time since he was born.
They put their things in the house where they would stay during the vacation and Tuna told his father that he wanted to go to the sea right away. His father said that he could take Tuna, not for swimming, but for traveling and seeing the sea. Tuna was overjoyed and they immediately started their trip. The huge, deep blue, endless sea fascinated Tuna. While his father and Tuna were enjoying their trip, Tuna suddenly stopped and saw a lot of garbage on the sea. He was very sad and angry. He thought that he could not leave the garbage there, spoiling this beautiful view, and immediately made a plan.

Video to explain "What is a skimmer and how does it operate? monitored.

https://www.youtube.com/watch?v=M4hSpGzoVsE

2. PHASE PROBLEM: (5 min)

The garbage thrown into the seas both aesthetically damages our environment and affects the creatures living in the seas. Let's design a product that can support eliminating this problem.

Ingredients:

- -Iron wire
- -Tulle
- -Sopa
- -Silicone gun
- -A large basin filled with water (Various waste materials that we can throw into the water...)

Recommendations for the Practitioner:

Instead of iron wire, a plastic bottle with a wide mouth (a 5-liter water container can be used by cutting two sides and forming a cylinder) can be used.

-The material specified as tulle will act as a net. It can be tulle or curtain tulle.

-Silicone gun will be used to glue the tulle under the control of the teacher.

3. STAGE IDEA GENERATION: (15 min)

(Ideas are generated about the problem situation. All ideas are noted. Idea by voting Determined.

Preliminary Preparation

The teacher asks the children various questions:

What kind of garbage might the Danube have seen on

the water? What can be done to prevent too much litter

in the sea? How could Tuna design a product to clean up

the garbage? ***Lesson Flow:***

At the beginning of the lesson; "What kind of product can we design with the materials we have for Tuna to clean the garbage in the sea?". The answers from the children are written on the board.

"Let's use the materials to make a product that will allow the Danube to clean up the garbage in the sea."

4.STAGE PROTOTYPE CREATION: (20 min)

The design is concretized through the idea produced. (Drawing)

Preliminary Preparation

-Students are divided into groups of three and are expected to discuss their ideas on the topic.

-Distribute drawing paper for each student to sketch his/her idea.

Course Flow

-Each student draws his/her own idea.

-Groups are checked frequently to ensure that they do not go off topic.

-The teacher walks around the groups, listens to the ideas developed by the students and observes the process. At the final idea selection stage, students are supported in selecting a feasible idea.

Product Development:

-The materials to be used are examined by the children.

-They are asked to explain with which materials the prototype will be made.

-Students who receive their materials are expected to create a model in accordance with the drawings.

Referrals are made if necessary.

-Children are assessed using the Teamwork Rubric.

Social Product: Teamwork Rubric: Teamwork Rubric, teacher's STEM
Within the scope of the course, each student will be assigned a task within their own team, communication within the group,
in the context of sharing and behavior.

	6-5	4-3	2-1	Score
Understanding	The student fully understands the purpose of the task.	The student partially understands the purpose of the task.	The student did not understand the purpose of the task.	
Group Dynamics	Student, everyone accepted by as a group decision defined roles is aware of and applies. Discuss about the process and other members in order to inform are in a state of sharing. A collection of his work keeps a group log and records important events.	The student, diligently works but the roles not clarified for more students less efficient. All with students in a shared state It is not.	The student did not work diligently. Roles were not defined, so the student did not work efficiently and did not share. The student is not aware of the work of his/her teammates.	
Behavior	Student, group contributing to the debate and the team the opinions of your friends listens. Always on duty works on it. Group to work contributes.	Student, willing to compromise is not Help the team that needs to your friends enough useful contribution did not.	Student, alone works To other people. and it didn't help did not contribute.	
Total Score				**...../ 18**

5. PHASE TRIAL: (10 min)

-It is checked whether the product is suitable for the prototype.

-If the product does not have the desired characteristics, it is requested to repeat the working steps for the necessary corrections.

6. STAGE PROTOTYPE PRESENTATION: (20 min)

All groups present their products and are observed to see if they have done the given task.

-To test the product, a container is filled with water and the blue lids previously asked from the children are thrown into it. First of all, one member from each group is asked to clean the most lids from the container with the product for a certain period of time. This gamified process can be continued with other students after checking the product with a member from the whole group.

7. STAGE EVALUATION: (10 min)

All groups evaluate and score other groups' products according to the evaluation rubric - Social Product: The product is evaluated using the General Rubric.

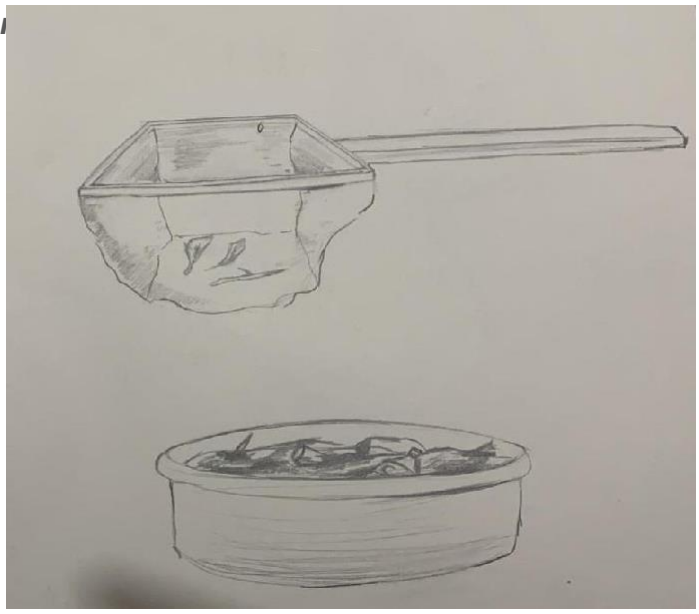
Social Product: General Rubric: Social product concrete object, algorithm, model (equation, graph) or research design (experimental setup).

Category.	4	3	2	1	Points Awarded
Idea Development	It is clear that existing known models and knowledge are taken into account in the product.	The idea behind the product is clear and easy to understand.	Some points in the idea of the product are not clear and need clarification he hears.	Known models did not take it into account.	
Scenario Relationship	The desired criteria are emphasized and detailed information is provided. In addition, some points are above the desired level and deepening is provided.	Desired criteria were emphasized and detailed information was provided.	The desired criteria are emphasized but the information used is limited.	All the limitations highlighted in the script were not taken into account.	
Quality (Integrity, integrity)	The product is correctly finished and looks attractive. The project is enriched with personal touches.	The product has been completed correctly and it is clear that care has been taken.	The product is complete but some details are limited in terms of care.	The product is not complete. Some parts of the product are missing and sloppy.	
Material Use (tool-equipment, materials, mechanics, etc.)	The given materials were used correctly. The appeal and originality of the product is enhanced by small creative adaptations of the materials.	The given materials were used correctly.	The materials provided were incomplete and used in a sloppy manner.	The materials given were too limited to be sufficient to create the product.	
Authenticity	The product shows completely original thinking and creative ideas. It contains a personal touch. It is unorthodox and surprising.	The product presents some original ideas and different perspectives.	The instructions given while creating the product were used, but the product could not reveal its own results. It was limited in terms of attractiveness.	The product is not original. Only the information given is repeated. It is an ordinary product without care and attention. The product does not go beyond the instructions given when creating the product.	
Total points					**...../20**

STAGE 8 DEVELOPMENT: (10

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

Recommendations for the Practitio



-Before starting the process, Barroux's book "Where is the Starfish?" can be examined to draw children's attention to the subject and arouse curiosity.

-For the game to be played at the stage of presenting the prototype, children can be asked to bring blue lids a few days in advance.

-The teacher can advance the process by getting support from the visual shared below on product design.

SOURCE:

- TURMEPA If There is Sea, There is Life (Quote Date: 15.01.2021) https://www.youtube.com/watch?v=FjlougGt3DY
- TURMEPA Underwater Waste Exhibition 2014 (Retrieved: 15.01.2021) https://www.youtube.com/watch?v=AQx3iGe5i18
- Sea Broom (Retrieved 15.01.2021) https://www.youtube.com/watch?v=M4hSpGzoVsE

Launching Airplane

Course Title:	Science	Subject:	Force and motion

Science Acquisitions:

F.4.3.1. Effects of Force on Objects

F.4.3.1.1. Conducts experiments on how force gives motion to objects and changes the shape of objects.

Engineering Gains:

MTB1 - Defining the design problem needed in daily life and determining the qualities and possible obstacles that the design must have in order to be successful.

MTB2 - The student determines the stages required to produce the product to be designed and presents the product appropriately.

Technology Gains:

1. Builds a body of knowledge by actively exploring real-world issues and problems, developing ideas and theories, focusing on answers and solutions.

2. Consciously uses the design process to generate ideas, test theories, create innovative artifacts or solve real problems.

3. Select and use digital tools to plan and manage a design process that takes into account design constraints and calculated risks.

4. Develop prototypes as part of an iterative design process.

Mathematics Outcomes

M.4.4.1.4. Solves problems related to daily life using information shown in column graphs, tables and other graphs. Problem-solving activities are also included.

M.4.3.1.3. Estimates a length that can be measured directly with the most appropriate length measurement unit and checks the estimate by measuring.

1. STAGE SCENARIO: (10 min)

The little mouse lived on a small island with his four mouse friends. These five friends were working with all their might to beautify their island and they were succeeding. Their little island became such a sweet place that the seagulls passing overhead could not hide their admiration for the beauty of the island and kept singing. Of course, the mice were also very happy and they were living happily on their island. One day the mice lit a fire to keep warm and were singing and having fun around it. Just then, they came to another island nearby.

they heard voices they had never heard before. They stood up to see, but they could see nothing. The sound became more intriguing by the minute and the mice started to think of ideas to find out what was going on on that island. First they climbed a tree, but they didn't understand anything. One of them said, "I wonder if we could climb to the highest hill on the island to see what is going on?" So the little mice immediately ran to the highest hill of the island, but in vain. Finally, the little mouse suddenly shouted, "I found it!"

We must all go to that island together.

"But how? We can't swim!" said another mouse. "We don't

have to swim, we can fly there. "said the little mouse.

"Even if we build an airplane, how can we fly it, little mouse? Is it easy to fly such an airplane?" said the big mouse. Then the little mouse said:

"We'll build a ramp to launch our plane to the other island."

All the mice liked this idea and they all got to work together.

2. PHASE PROBLEM: (10 min)

Designing a suitable ramp so that the airplane on the ramp can launch the farthest and a suitable airplane that can launch the farthest.

What should be the shape of the airplane to be launched?

What should the wings be like, what should the design of the fuselage be like, so that the airplane can launch farther?

How can the airplane be designed to fly the farthest and what materials can be used?

What should be the shape, height and stance angle of the ramp that

launches the airplane? Which materials should we focus on using when

designing the ramp? What kind of launch system can be installed on the

designed ramp?

What should be the main material of this launch system?

What kind of support system should we design to keep the ramp stable in our hands or on the ground?

Ingredients:

- Abeslang (Tongue Sticks),
- Invisible Tape (Because It Is More Slippery Than Other Tapes),
- One Package Tire

3. STAGE IDEA GENERATION: (10 min)

Before coming up with ideas, children should first read the article "How Force Affects the Motion of Objects?
video is shown.

https://ders.eba.gov.tr/ders/proxy/VCollabPlayer_v0.0.772/index.html#/main/curriculumResource?resourceID=06b422542fff88e9a1c35a0c7944d639&resourceTypeID=3&loc=0&locID=f1be2b0e540679eb81a417cf64efe000&showCurriculumPath=false

Students are divided into groups. Each group is given enough material to design a product. At the end, the students are clearly told that what is expected of them is to design the mechanism that launches the farthest and the ramp that can launch this mechanism the farthest. Students try to reach the best by making different prototypes at different design stages. Brainstorming method is used at this stage.

4. STAGE PROTOTYPING:

With the guidance of the teacher, students should design a ramp and an airplane that will take off from this ramp. The primary goal is that it fulfills its function, that is, the airplane can take off.

Limitations:

Prototypes should be completed in 2 class hours.

After each group has designed several different prototypes, they should decide which design to use in a 10 minute trial period.

Profession, duties and responsibilities:

- Aircraft Engineering
- Mechanical Engineering
- Civil Engineering
- Duties and responsibilities:
- Printer
- Spokesperson
- Designer
- Researcher

Preliminary Preparation

-Students are divided into groups of four and are expected to discuss their ideas on the topic.

-Distribute drawing paper for each student to sketch his/her idea.

5. PHASE TRIAL: (10 min)

At this stage, the groups record the data obtained from the prototypes they have created in a table they have prepared. They choose the most accurate design by looking at the data obtained from the table.

The table should be organized according to the following headings:

-Did the planes fly?

-If so, how far did it fly? (Measurement is made with a standard measuring instrument and
the data obtained is recorded in the table).

6. STAGE PROTOTYPE PRESENTATION: (20 min)

All groups present their products and observe whether the work is done or not.

7. STAGE EVALUATION: (10 min)

The teacher evaluates the products of the groups according to the evaluation rubric and

Points.

Teamwork Rubric

	6-5	4-3	2-1	Score
Understanding	The learner should understand the purpose of his/her task understands completely.	The learner partially understands the purpose of his/her task moments.	The student did not understand the purpose of the task.	
Group Dynamics	The learner is aware of and implements the roles agreed upon by all and determined as a group decision. They share in order to discuss and inform other members about the process. Keep a group diary of their work and record important events.	The student works diligently but is less productive because roles are not clarified. Not shared with all students.	The student did not work diligently. Roles were not defined, so the student did not work efficiently and did not share. The student did not realize that the work of his/her teammates is not aware of it.	
Behavior	The learner contributes to group discussions and listens to the ideas of his/her teammates. Always works on the task. Makes the necessary contribution to group work.	The student is not willing to compromise. He/she does not make enough useful contributions to teammates who need help. did not.	The student works alone. He/she has not helped or contributed to others.	
Total Score				**...../ 18**

2.General Rubric

Category.	4	3	2	1	Points Awarded
Idea Development	It is clear that existing known models and knowledge are taken into account in the product.	The idea behind the product is clear and easy to understand.	Some points in the product idea are not clear and need clarification.	Known models did not take it into account.	
Quality (Integrity, integrity)	The product is correctly finished and looks attractive. The project is enriched with personal touches.	The product has been completed correctly and it is clear that care has been taken.	The product is complete but some details are limited in terms of care.	The product is incomplete, missing some parts and sloppy.	

Material Use (tool-equipment, materials, mechanics, etc.)	The given materials were used correctly. Small creative adaptations to the materials can enhance the appeal of the product and originality is enriched.	The given materials were used correctly.	The materials provided were incomplete and used in a sloppy manner.	The materials given were too limited to be sufficient to create the product.	

Category.	4	3	2	1	Points Awarded
Authenticity	The product shows completely original thinking and creative ideas. It contains a personal touch. It is unorthodox and surprising.	The product presents some original ideas and different perspectives.	The instructions given while creating the product were used, but the product could not produce its own results. In the context of attractiveness limited.	The product is not original. Only the information given is repeated. It is an ordinary product without care and attention. The product does not go beyond the instructions given when creating the product.	
Distance	The product has reached the desired distance.	The product has approached the desired distance.	The product did not approach the desired distance but worked.	The product did not work.	
Total points					**...../20**

8. **STAGE DEVELOPMENT: (10 min**) improves the parts of the presentation and evaluation of his/her work that he/she thinks are missing or need to be corrected.

Suggestions for the Practitioner: The teacher may not limit the children to airplanes, but accept designs of all products that can slide off the ramp.

Talk about the professional skills that children will acquire while designing this product. Photographs and videos of machines working with the launching system can be shown.

9. **SOURCE:**

- https://ders.eba.gov.tr/ders/proxy/VCollabPlayer_v0.0.771/index.html#/main/curriculumResource?resourceID=06b422542fff88e9a1c35a0c7944d639&resourceTypeID=3&loc=0&locID=f1be2b0e540679eb81a417cf64efe000&showCurriculumPath=false

Journey to the Magic World

Course Title:	Science	**Subject:**	Living Things and Life / Light and Vision

Target Outcomes

F.3.6.2.5. Natural the environment living beings for the importance difference. arrives.

F.3.6.2.6. Proposes solutions by conducting research to protect the natural environment.

Science Acquisitions:

F.3.5.1. The Role of Light in Vision: F.3.5.1.1. Concludes that light is necessary for vision to occur as a result of observations.

F.3.5.2. Light Sources: F.3.5.2.1. Classifies the light sources in the environment as natural and artificial light sources.

F.3.3.2.1. Discover that pushing and pulling are forces by experimenting.

F.3.3.2.2. Define force by observing the effects of pushing and pulling forces on moving and stationary objects.

F.4.5.2.1. Researches about appropriate lighting.

F.4.5.2.2. Discusses the importance of economical use of lighting tools in terms of family and national economy.

F.4.7.1.1. Recognizes the circuit elements that make up the simple electrical circuit with their functions.

F.4.7.1.2. Builds a working electrical circuit.

Life Science Outcomes:

HB.3.6.1. Understands the importance of plants and animals for human life.

HB.3.6.4 Gives examples of the effects of humans on natural elements from his/her immediate environment. Positive and negative effects of humans on the natural environment are emphasized. Care is taken to give examples of positive effects. Examples of endangered species are given. HB.3.6.5. Takes responsibility for protecting nature and the environment. The importance of keeping natural resources such as water, air and soil clean, using them appropriately and planting trees for a better livable environment is emphasized. In addition, non-governmental organizations interested in the subject are introduced at a basic level.

HB.3.6.6. Gives examples of the contribution of recycling to himself/herself and the environment he/she lives in. The ways in which materials such as plastic, paper, batteries and glass are collected and the areas where they can be reused are exemplified. The contribution of this process to the environment is emphasized. Students are made to realize that they can play a role in sustainability by using one of the listed materials and giving it a different function.

Engineering Gains:

1. It enables the definition of the design problem needed in daily life and the determination of the qualities and possible obstacles that the design must have in order to be successful.

2. The student determines the stages required to produce the product to be designed and presents the product appropriately.

3. The ability to design a system, component or process to meet specific requirements within realistic constraints (economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability).

4. To have the broad education necessary to understand the impact of engineering solutions in global, economic, environmental and societal contexts.

5. To have knowledge about the issues of our age.

Technology Gains:

1. Actively exploring real-world issues and problems, developing ideas and theories, and building a body of knowledge, focusing on answers and solutions.

2. Consciously uses the design process to generate ideas, test theories, create innovative artifacts or solve real problems.

3. Explains the construction drawing of the design.

4. Plans and realizes the construction stages of the design.

Mathematics outcomes:

M.3.3.3.3.1. Cover the area of the shapes with appropriate non-standard material.

1. STAGE SCENARIO: (5 min)

Başar is an environmentally sensitive child who loves nature and respects the right to life of every living thing. He spends most of his days in the small forest near their house, taking care of animals and plants. On one of these days, Başar, who is walking around the forest with joy, sees a glowing object in the distance. Curious, he approaches the object and realizes that it is an interesting looking box. At least, Başar thinks that this object looks like a box. Just as he reaches out his hand to open the box, he realizes that there is a note on the box. The note reads as follows: '' Hello, little hero. The box in front of you opens to a magical world and if you have found this box, then you are a beautiful child who is doing your best for nature. Now I know you are wondering what is inside, but this box has a special feature: "the moment you touch the lid, the box will disappear. You have to find a way to see inside without opening the lid. I know a child like you will have no trouble finding it. Good luck.

2. PHASE PROBLEM: (1 hour)

1. Electrical circuit elements in order to be able to install the lighting system by introducing How that it works is explained. Students Electricity circuit what they want they can use it as such.

1. Students are shown a video with examples of Pascal's apparatus. They are told that they can use this device. (For example, students may think of opening the lid with Pascal's device to see inside the box, in which case they do not have to use an artificial light source.) https://www.youtube.com/watch?v=Xz60Psx_Cp0

2. At this stage, the video linked below, which explains the effect of light on vision, is shown to the students and discussed.

https://ders.eba.gov.tr/ders/proxy/VCollabPlayer_v0.0.771/index.html#/main/curriculumResource?resourceID=d77bc29ab8a0e1f240908daa196fefb9&resourceTypeID=3&loc=0&locID=bd00975e8d03bea630cee5145364a5fe&showCurriculumPath=false

3. The teacher can show the students photographs of habitats, bridges, roads, etc. created by humans without harming nature.

Published on Monday, March 02, 2020, Monday 10:35, on the official website of Posta newspaper: "Visit the Hobbit Village, the land of Lord of the Rings: Where is the Hobbiton movie set? Excerpted from the news article.

https://www.posta.com.tr/yuzuklerin-efendisinin-diyari-hobbit-koyunu-ziyaret- get-hobbiton-film-set-where-photographs-2241841-3 address, Accessed on 16.01.2021

Retrieved from https://www.sozcu.com.tr/2015/gunun-icinden/en-guzel-yollar-918285/1/?_szc_galeri=1 on 16.01.2021.

No trees were cut down during the construction of this road.

Published on the official website of Sözcü Newspaper on August 25, 2015, 06:47 " "The Most Beautiful Roads Excerpted from the news article.

5. Students are expected to think about the following problems.

In recent years, people have been violating the right to life of other living things while designing their living spaces. The diversity of living things is decreasing day by day and the balance of nature is deteriorating.

To create a living space that respects nature;

How can we create our habitat without affecting the habitats of other living things too much?
we can design?

How can this environment we have designed serve other living beings?

Our homes

What materials can it be made of?

How many floors can it have?

What should the exterior

look like? What should

the perimeter look like?

What to heat with, how to generate electricity?

What kind of lighting system can be developed to see inside the closed box?

How can this lighting system be placed so that the most appropriate lighting system is installed?

Ingredients:

- Cardboard, a big box with a lid,
- Dark acetate or dark color transparent skin,
- Utility knife,
- Scissors,
- Silicone glue,
- Liquid adhesive,
- Stapler
- Coffee sticks,
- Waste materials found at home (fabric boxes, etc.),
- Syringe
- IV hose
- Electric circuit elements (solar panel instead of battery as energy source);
- Soil,
- Plant,
- Tree branch
- From nature like a leaf Materials.

3. STAGE IDEA GENERATION: (15 min)

Students are divided into groups. In the idea generation phase, the "retroductive" (suggesting brand new and original solutions) reasoning technique is used and brainstorming, one of the problem solving techniques, is used.

4. STAGE PROTOTYPING:

The teacher presents the students with the materials they will use. She asks them to draw a sketch of the world they will design.

5. Students are expected to think about the following problems.

Limitations:

The drawing should be completed within 30 minutes.

Students should choose the materials they will use at the drawing stage. (group can choose up to three of one material).

Duration: 4 class hours (Drawing time is not included in this duration)

Profession, duties and responsibilities:

Environmental

Engineering Civil

Engineering

Landscape

Architecture

Electrical Engineering

Duties and responsibilities:

Printer

Spokesper

son

Designer

Researcher

Preliminar

y

Preparatio

n

-Students are divided into groups of four and are expected to discuss their ideas on the topic.

-To enable every student to put ideas together and draw
paper is distributed to the groups.

5. PHASE TRIAL: (10 min)

The created prototype is checked. Corrections are made if necessary.

6. STAGE PROTOTYPE PRESENTATION: (20 min)

All groups present their products and are observed to see if they have done the given task.

7. STAGE EVALUATION: (10 min)

The teacher evaluates and scores the products according to the evaluation rubric.

Social Product Teamwork Rubric

	6-5	4-3	2-1	Score
Understanding	The learner should understand the purpose of his/her task fully understands.	The student partially understands the purpose of the task.	The student did not understand the purpose of the task.	

Students should choose the materials they will use at the drawing stage. (

Group Dynamics	The student is recognized by everyone accepted and group decision of the roles defined as is aware of and applies. Process and discuss about other in order to inform members in a state of sharing. A group of their work keeps a diary and records important events records it.	The student, diligently works but the roles because it is not clarified fewer students efficient. All with students in a shared state It is not.	The student did not work diligently. Roles were not defined, so the student did not work efficiently and did not share. The student did not realize that the work of his/her teammates is not aware of it.	

	6-5	4-3	2-1	Score
Behavior	The learner contributes to group discussions and listens to the ideas of his/her teammates. Always works on the task. Makes the necessary contribution to group work.	The student is not willing to compromise. Give enough to teammates who need help as much useful contribution.	The student works alone. He/she has not helped or contributed to others.	
Total Score				**...../ 18**

Social Product: General Rubric

Category.	4	3	2	1	Points Awarded
Idea Development	It is clear that existing known models and knowledge are taken into account in the product.	The idea behind the product is clear and easy to understand.	Some points in the idea of the product are not clear and need to be explained needs.	Known models did not take it into account.	
Quality (Integrity, accuracy)	The product is correctly finished and looks attractive. The project is enriched with personal touches.	The product was completed correctly and care was clearly taken It's understood.	The product is complete but some details are limited in terms of care It has stayed.	The product is incomplete, missing some parts and sloppy.	
Material Use (tool-equipment, materials, mechanics, etc.)	The given materials were used correctly. Small creative adaptations to the materials can enhance the appeal of the product and its authenticity is enriched.	The given materials were used correctly.	The materials provided were incomplete and used in a sloppy manner.	The materials given were too limited to be sufficient to create the product.	
Authenticity	The product shows a completely original thought and creative idea. It contains a personal touch. It is unusual and surprising.	The product presents some original ideas and different perspectives.	The instructions given while creating the product were used, but the product could not reveal its own results. It was limited in terms of attractiveness.	The product is not original. Only the information given is repeated. No care was taken with the product, it is an ordinary product. The product does not go beyond the instructions given when creating the product. not passed.	
Design Amaca Relevance	The designed product is environmentally friendly and supports the civilized life of people. The interior of the design can also be observed with appropriate lighting.	The product is designed as a natural and artificial environment, but the unity of natural and human elements is not achieved. Lighting and the product observation was ensured.	A living space is designed but not enough space is given to the natural environment. Observation of the product is ensured with lighting.	Natural and human elements are not in harmony when designing the product. In addition, the product could not be observed with lighting.	

Total points	**...../20**

8. STAGE DEVELOPMENT: (10 min)

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

Suggestions for the Practitioner: The teacher can show the students photographs of habitats, bridges, roads, etc. created by humans without harming nature. Talk about the professional skills that children will acquire while designing this product.

SOURCE:

- https://ders.eba.gov.tr/ders/proxy/VCollabPlayer_v0.0.771/index.html#/main/curriculumResource?resourceID=d77bc29ab8a0e1f240908daa196fefb9&resourceTypeID=3&loc=0&locID=bd00975e8d03bea630cee5145364a5fe&showCurriculumPath=false
- https://www.posta.com.tr/yuzuklerin-efendisinin-diyari-hobbit-koyunu-ziyaret- get-hobbiton-film-set-where-photographs-2241841-1
- https://www.sozcu.com.tr/2015/gunun-icinden/en-guzel-yollar-918285/7/?_szc_galeri=1

Balance and Weighing

Course Title:	Mathematics	Subject:	Measurement

1.1. Outcomes of the Main Discipline:

Mathematics

Sub Learning Area: Weighing

M.3.3.6.1. Measures objects in grams and kilograms.

M.3.3.6.2. Estimates the mass of an object and checks the accuracy of the estimation by measuring.

M.3.3.6.3. Solves problems related to kilograms and grams.

1.2. Acquisitions belonging to other disciplines:

Science

F.3.4.1.1. Explains the basic properties that characterize matter using the five senses.

Sub-achievements belonging to the STEM field:

Uses creativity skills to create original products as a result of their work. Develops the skills to fulfill his/her role in a team by working in a group. Engineering and Design Skills:

Creates products for project work with innovation and invention skills.

Ingredients:

- Scissors, cardboard (fondant cardboard type),
- Adhesive
- Thick rope
- Piece of wood,
- Clothes hanger
- Bag
- Plate-shaped materials

1. STAGE SCENARIO: (20 min)

Enter the classroom with seasonal fruits, packaged dry food products and an equal-armed scale and tell the students the following story.

Ahmet and his mother go to the market. They buy apples, tangerines and oranges from the fruit section. Then they buy a packet of rice, a packet of bulgur and a packet of lentils from the dry food section.

When they approached the checkout section of the store, Ahmet said to his mother:

-Mother, we didn't have the fruit weighed. -How do we know how much to pay? he asks.

His mother tells him that there is an electronic scale at the cash register and they will weigh themselves there and find out how much they have bought.

They go to the cash register, and when it is their turn, the electricity goes out. Ahmet's mom:

- Oh, what are we going to do now? We didn't have a chance to weigh the products. He says, "We know the price of the others, we would have paid, but we don't know about the fruits.

They don't have time to wait for the electricity, so they have to leave, leaving the fruit behind.

After telling this story, students are asked the following questions;

a) Have you seen electronic scales in the market?

b) What do you think was used before electronic scales?

c) He asks the class what the product (equal-armed balance) is and whether they have seen it before.

At this stage, students are asked to continue the story.

A scenario is organized in the classroom in accordance with the question of what would happen if there were equal-armed scales in the market. Divides the students in the class into 3 groups and assigns them to the market stalls. They place seasonal fruits brought to the class on each counter.

She asks the students in the groups to take as much fruit as they want from each stall and measure it on the scales themselves to ensure balance. Students also weigh the ready-made packages and compare them with the values written on them. They can also weigh other classroom materials they are curious about. At this point, it is decided what the students should do to understand the concepts of grams and kilograms and what they should do to balance on an equal-armed scale.

Process Steps:

Questions related to the associated lessons are prepared and each student is called back to the equal-armed scales.

On one side of the scale, the teacher places the products whose weights he/she knows and each student is first asked to estimate the weights of these products.

Then, if the student answers the questions correctly, the weight of the fruit is given to the student to find the weight of the fruit.

After the activity, the teacher explains to the students how balance is achieved with an equal-armed balance.

Manavdan sebze ve meyve alırken manav istediklerimizi tartarak verir. Kasaptan et alırken et tartılır. Fırına ekmek yaprken hamuru tartarak ayırır. Ekmek yapar.

Pazardaki bir satıcı istediğimiz meyve veya sebzeyi tartının- terazinin bir tarafına , diğer tarafına ise kilogramı ya da gramları koyar. Terazinin iki tarafı da hizalanırsa satın aldığımız meyve veya sebzeyi tartmış olur.

Terazinin nesne ve kilogramları konulduğu bölümüne **kefe** denir.

Günümüzde elektronik teraziler daha çok kullanılmaktadır. Bu teraziler hem tartıyor hem de fiyatı belirliyor.

1 kilogram = 1000 gram

Tartma yapılırken **kilogram** ve ve **gram** kullanılır. Tartmada kullanılan ölçü birimi **kilogram**dır.

Kilogram kısaca **kg** olarak yazılır.

Gram , kısaca **g** olarak yazılır.

1 kilogram = 1 000 gramdır. **1 kg= 1 000 g'dır.**

(Uslu, 2013)

2. PHASE PROBLEM: (20 min)

In this section, students are told that equal-armed scales are not available everywhere. They are asked what kind of a solution they would produce in this situation and asked to create creative scales by following the stages of design processes. Groups of four are formed and each student group is given scissors, cardboard (fondant cardboard type), glue, thick string and a piece of wood.

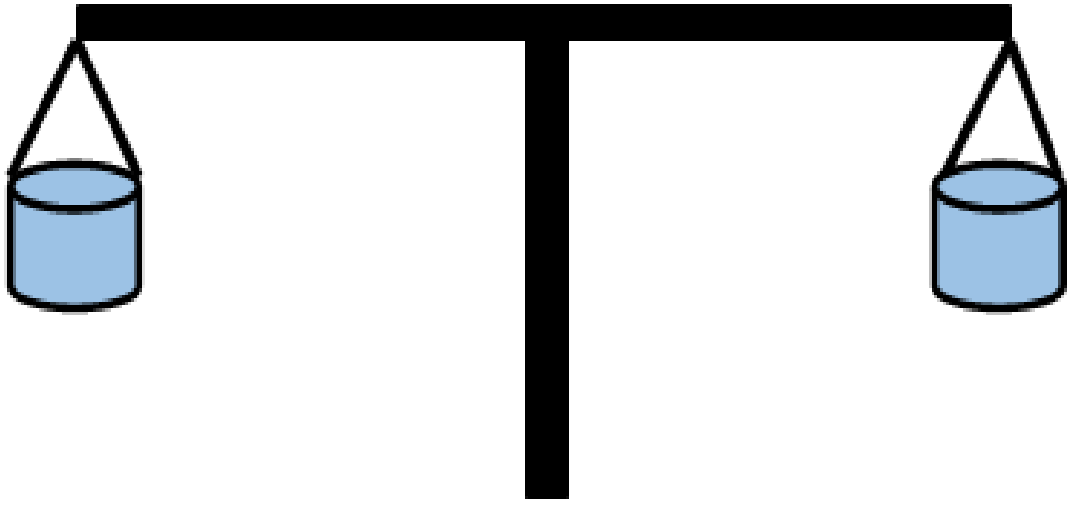
Students realize that when measuring, they need to find the mass of unknown objects by using packages with known measurements on an equal-arm balance.

3. STAGE IDEA GENERATION: (20 min)

Determines the materials to be used. Determines the measurement method. The process of creating balance pans, balancing, planning where to place the parts by using materials without measuring instruments is realized.

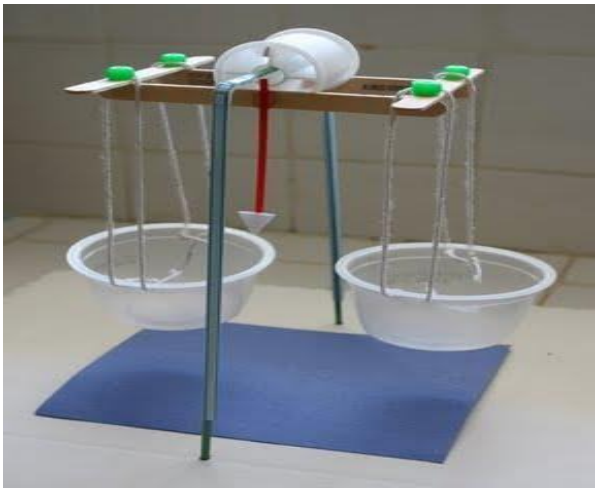
4. STAGE PROTOTYPING:

He draws the plan of the scale he will make.



5. PHASE TRIAL: (5 min)

The prototype is tested and its operation and functioning are checked. Corrections if necessary
It is done.



Improves the product. The product in the figure is given as an example. Student groups will design according to the materials of their choice.

Students measure whether the scales they have made provide the correct balance. They receive suggestions for improvement. Students present their scales to their friends and explain how to measure.

(ureticifikirler, 2011)

6. STAGE PROTOTYPE PRESENTATION: (20 min)

All groups present their products and are observed to see if they have done the given task.

7. STAGE EVALUATION: (10 min)

The Whole groups other groups products evaluation rubric evaluates and scores them accordingly.

Students what they do equal sleeves scales below given to scale is evaluated accordingly.

FEATURE	MUST BE IMPROVED 5 POINTS	MEDIUM 6 POINTS	GOOD 8 POINTS	VERY GOOD 10 POINTS
Understanding the problem correctly				
To be able to produce appropriate solutions to the problem				
To be able to produce original ideas suitable for the project				
Distributing tasks within the group				
To be able to complete the model of your product				
Resemblance to the design of the product				
Ability to measure on an equal-arm balance				
Establishing a relationship with the course in the presentation				
Expressing units correctly when making a presentation to				
To be able to use presentation time				
TOTAL				

8. STAGE DEVELOPMENT: (5 min)

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

SOURCE

- Producer Ideas. (2011, jan 06, 2011). ureticifikirler on December 17, 2020: Retrieved from https://ureticifikirler.wordpress.com/2011/01/06/el-yapimi-terazi/
- Uslu, Ö. (2013, December 8). Eğitimhane. Eğitimhane website on December 17, 2020: Retrieved from https://www.egitimhane.com/3-sinif-matematik-tartma-konu-anlatimi- ve-alistirmalar-d126604.html

Illuminated Map

Course Title:	Social Studies	**Subject:**	Global Connections

Social Studies Outcomes:

SB.4.7.1. Introduces various countries in the world. Recognizes the importance of Turkey's place in the world.

SB.4.7.2. Turkey's relations with its neighbors and other Turkish Republics comprehends.

Science Acquisitions:

F.4.7.1.1. Recognizes the circuit elements that make up the simple electrical circuit with their functions.

F.4.7.1.2. Builds a working electrical circuit.

Technology Gains:

1. Creates the algorithm of the product.

2. Integrates the designed product into different studies (Far countries, neighboring countries etc.)

Mathematics Outcomes:

M.2.3.1.1. Measures a length using different non-standard units of length measurement in combination and makes repeated measurements with parts of the non-standard unit divided into twos and quarters.

21. Century Skills and Gains:

1. Three-dimensional thinking skills develop.

2. Be sensitive to the environment, the world and the universe.

3. He sees that there is power in civil initiative.

4. Adapt to different roles and responsibilities.

Engineering Gains

1. Examines how engineering practices affect humanity environmentally, economically and politically.

2. Identifies the processes involved in an engineering project.

3. Explains the stages such as planning, design, execution, quality and reporting.

4. In the project work, the student assumes himself/herself as a team member in different roles and successfully completes the work required by that role.

1. STAGE SCENARIO: (5 min)

Ayda loved reading books. With each book she read, she got to know different lives, places and personalities and was very impressed. This week her teacher asked her to read a book by Genghis Aitmatov. Ayda was very impressed by Aytmatov's quote "The most difficult thing for a human being is to remain human every day." While researching about him, she learned that Aytmatov was a world-famous writer from Kyrgyzstan.

He knew that Kyrgyzstan was a Turkish state. His father had mentioned that countries are related to each other just as people are related to each other. "Countries of the same nationality, speaking the same language, united by culture and history are related countries," he said. "Turkey is also related to the Turkic Republics," his father said.

He learned that Azerbaijan, Kazakhstan, the Turkish Republic of Northern Cyprus, Uzbekistan and Turkestan are also Turkish republics. She learned that Turks who migrated from Central Asia founded countries other than Turkey and that some Turks live in other states. Ayda decided to research the current Turkish states and where they are located in the world.

2. PHASE PROBLEM: (5 min)

Design a lighted map to teach Ayda the location of the Turkish republics Are you?

Where are the Turkish states?

What are the capitals of Turkic states?

What is the flag of the Turkish states?

How close are the Turkic states to Turkey? Teacher

instruction: (10 min.)

Introduction of Independent Turkic States (ÇETİN, 2014), EBA education platform Turkish republics are introduced by watching the videos Our relations with our neighbors and Turkic republics (EBA.2020), Our economic relations with Turkic States (EBA,2020).

Simple circuit with Related Electricity Information circuit video by showing will be made (EBA, 2020)

A circuit consisting of a battery, light bulb, switch and connecting cables is called a simple electrical circuit.

The battery in the circuit is the source of electrical energy and transfers electrical energy to the negative electric charges, the electrons, causing them to vibrate and generate an electric current.

The conductor wire in the circuit allows the flow of electrical energy gained by electric charges, i.e. electrons.

The light bulb in the circuit indicates whether or not electrical energy has passed through the conductor wire, i.e. whether an electric current has been generated.

The switch in the circuit allows electrical energy to pass or not pass.

In simple electrical circuits, when the switch is on, electrical energy, i.e. electric current, cannot pass through the circuit and the bulb does not light. Such circuits are called open circuits.

In simple electrical circuits, when the switch is off, electrical energy, i.e. electric current, can pass through the circuit and the bulb lights up. Such circuits are called closed circuits.(Science school.net)

Açık Devre

Kapalı Devre

A map is a representation of the whole or a part of the earth on a plane, reduced to certain proportions. (Wikipedia, 2020)

Limitations

Only the Turkic Republics will be illuminated.

The map will be illuminated using a simple electric

circuit. In a circuit, one flag should light up one country.

Each group will use only the materials given to them.

Ingredients:

- For 1 group:
- Map of Turkic states,
- 6 led light lamps,
- Conductor wire or aluminum strip,
- 3 batteries (3 v) flags of Turkic states,
- Cardboard, silicone adhesive

3. STAGE IDEA GENERATION: (10 min.)

The class is divided into groups and working groups are

formed: Which are the Turkic Republics?

Where in the world are the countries of the Turkic

Republics? What are the flags of the Turkic

Republics?

How to prepare a map?

What is a led lamp?

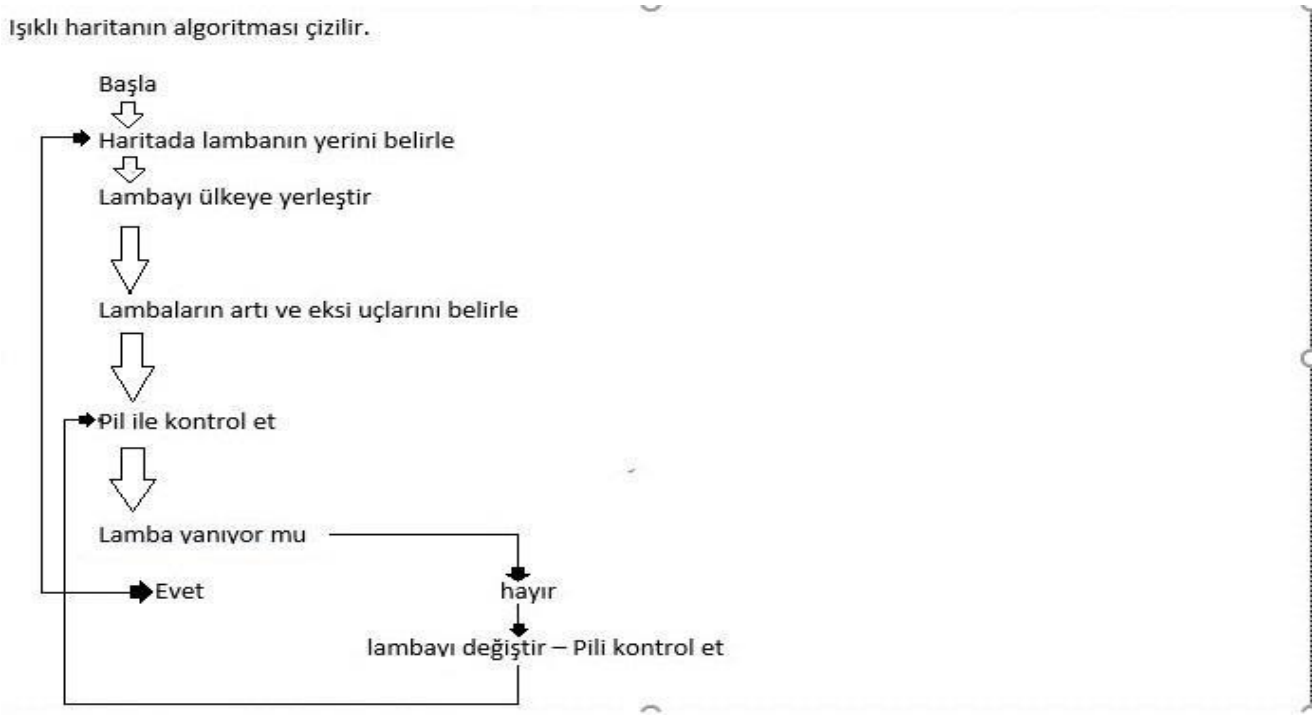
How should the conductor wire be?

How to build a simple electrical circuit? Brainstorming is done on the topics.

4. STAGE PROTOTYPE CREATION: (30 min)

The design is concretized through the idea produced.

(Drawing) The algorithm is made and the map assembly is prepared.



5. PHASE TRIAL: (10 min)

The prototype is tested and its operation and functioning are checked. Corrections if necessary

It is done.

Is there an electrical connection between the flag and the country? Does the country light up when you touch the flag?

Do the lamps point to the Turkic Republics?

6. STAGE PROTOTYPE PRESENTATION: (15 min)

All groups present their products and are observed to see if they have done the given task.

7. STAGE EVALUATION: (15 min)

1 - Evaluation will be done with Kahoot.

2- It will be evaluated with a rubric.

Rubric 1:

GROUP EVALUATION RUBRIC				
		Never ever	Sometimes	Always
1	Group members help each other			
2	Group members listen to each other's thoughts			

3	Each group member takes part in the work			
4	Group members use time wisely			
5	Fulfills individual responsibilities			

Rubric.2:

PRODUCT EVALUATION RUBRIC				
		Very good	Good.	Should be Worked on
1	Product designed fit for purpose			
2	Countries and flags correctly matched			
3	Circuits installed correctly			
4	Circuits are operational			
5	Economical use during operation			

8. STAGE DEVELOPMENT: (10 min)

1. Discuss with your groupmates what else you can do to build a simple circuit.

Based on this model, discuss what you can do to improve it.

With the QR Code application, a virtual trip to the Turkic Republics can be organized in the classroom.

PROJECT-RELATED PROFESSIONS AND CAREER CHOICE: (10 MIN.):

Map Engineering: It is the branch of engineering that deals with the measurement of the whole or part of the earth in metric terms with various techniques (position determination from satellites, satellite image processing, etc.) and the expression and depiction of the obtained spatial data in the form of maps and plans by evaluating them in computer environment; as well as all kinds of measurement, calculation, analysis and visualization studies related to location. Mapping Engineering is one of the branches of engineering that is open to technological developments and best applies modern technology. (wikipedia.2021)

SOURCE:

- Cetin, E.2014. Introduction Video of Independent Turkish States. Access Date: 05.11.2020 https://www.youtube.com/watch?v=Mo_iCz0Z-4Q
- EBA (2020). Our relations with our neighbors and Turkish republics. Access Date:06.11.2020 https://ders.eba.gov.tr/ders/proxy/VCollabPlayer_v0.0.757/index.html#/main/curriculumResource?resourceID=19245c953a3ce6c2f35ab6604f652399&resourceTypeID=3&loc=-1&showCurriculumPath=true
- EBA(2020) . Our economic relations with Turkic States. Erişim tarihi: 06.11.2020 https://ders.eba.gov.tr/ders/proxy/VCollabPlayer_v0.0.757/index.html#/main/curriculumResource?resourceID=1da7923519e3a60a55079795270be4d9&resourceTypeID=3&loc=0&locID=cba65_712017b93c766c70cd78907c528&showCurriculumPath=false
- EBA (2020) Simple electric circuit. Retrieved 04.11.2020 from https://ders.eba.gov.tr/ders/proxy/VCollabPlayer_v0.0.757/index.html#/main/curriculumResource?resourceID=cf786328efc70640a382d9328fb27bee&resourceTypeID=3&loc=-1&showCurriculumPath=true
- TR:WIKIPEDIA.ORG, (2020) Map. Access Date: 06.11.2020 https://tr.wikipedia.org/wiki/Harita

- FEN SCHOOL.NET. Simple Electric Circuit. Access Date: 03.11.2020 https://www.fenokulu.net/mobil/fen-konulari/konu1889
- Yaman. E, Akan.R., Doğan M., Sarı, Ö. 2020. Primary School Science, 4th Grade Textbook .İzmir: Çağlayan
- Tüysüz.S. (2018) Primary School Social Studies, Textbook-4 Ankara: Tuna
- Tr.Wikipedia.Org (2021) Map Engineering Access Date: 17.01.2021 https://tr.wikipedia.org/wiki/Harita_m%C3%BChendisli%C4%9Fi

Let's Design a Properly Lighted Home

Course Title:	Social Studies	**Subject:**	Global Connections

Science Acquisitions:

F.4.5.2.1. Researches about appropriate lighting.

F.4.5.2.2. Discusses the importance of economical use of lighting tools in terms of family and national economy.

Engineering Gains:

MTB1 - Defining the design problem needed in daily life and determining the qualities and possible obstacles that the design must have in order to be successful.

MTB2 - The student determines the stages required to produce the product to be designed and presents the product appropriately.

Technology Gains:

1. Actively exploring real-world issues and problems, developing ideas and theories, and building a body of knowledge, focusing on answers and solutions.

2. Consciously uses the design process to generate ideas, test theories, create innovative artifacts or solve real problems.

3. A design process that takes into account design constraints and calculated risks select and use digital tools to plan and manage.

Mathematics outcomes:

. M.2.3.1.4. Estimates lengths in units of meters or centimeters and checks the estimate by comparing it with the measurement result.

M.2.3.1.3. Measure lengths in meters or centimeters using standard tools in terms of the number of people.

M.3.3.3.3.1. Cover and measure the area of shapes with appropriate non-standard material.

1. STAGE SCENARIO: (5 min)

Elif had learned in class today that you can use the polar star to find directions at night. In the evening, she excitedly went out on the balcony and tried to see the pole star. The city was so bright that she could not see the stars. Her father took Elif to the village for the weekend. In the village, she saw so many stars in the night sky that it was as if thousands of lamps were burning. Her father also showed Elif the pole star and told her that this star is also called the iron stake. But Elif wondered why she could not see the stars in the city but could see them in the village. Her father explained that it was because of the light pollution in the city and that light pollution had other damages.

She explained that it also negatively affects natural life, migrating animals and plants. As Elif listened to the damages of light pollution, she felt very sad about the damage to nature. She thought about what causes light pollution at home and decided to design a house with appropriate lighting to minimize light pollution.

2. PHASE PROBLEM: (5 min)

How about designing a home together where light pollution is minimized?

Teacher instruction: (10 min) Watch videos on light pollution and prevention of light pollution on Eba digital education platform.(EBA, 2020)

Light pollution is the use of light in the wrong place, at the wrong time, in the wrong amount, in the wrong direction and at the wrong time (TUG, 2020).

In order to prevent light pollution, we need to reduce the light sources that are used more than necessary in living spaces. In addition, lighting errors in streets and parks should be eliminated and correct lighting systems should be built. With the development of technology, it should be ensured that the lights used with the development of technology are turned on and off when necessary, and light pollution can be prevented by using light where necessary. (e-okul.org.2020)

The slide on what to do to prevent light pollution is shown. (Aslan, İlbey Atay, 2011)

How is the lighting in our own homes?

What is the situation around us? Can

light pollution in homes be reduced?

To minimize light pollution;

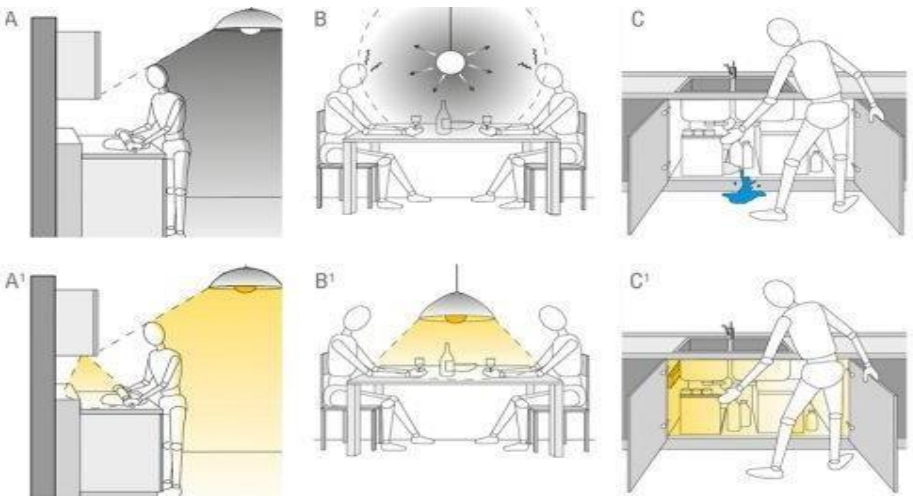
What is the appropriate window width?

What colors should the interior paint and flooring be?

What color should the furniture be?

Where should the lamps be placed in the space?

Which appliances emit light in the home? What kind of lamps should be used? What should be the direction of the lamps? The questions are answered. Examples of correctly illuminated spaces are shown.(aydınlatma.org.2019)



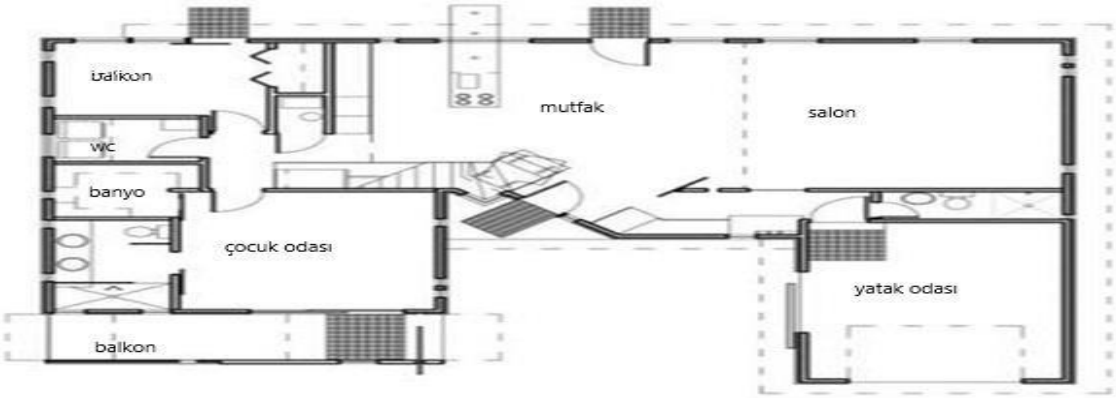
Images: Aslan, İlbey Atay, (2011), Pehlivanoğlu, Poyraz (2015) e-okul.org (2020)

Materials: Cardboard, modeling knife, silicone glue, ruler, liquid glue, scissors, coffee sticks, waste materials found at home (fabric boxes, etc.)

3. STAGE IDEA GENERATION: (10 min)

With the Jigsaw method, students are divided into 6 groups. A group is formed for each part of the house: Kitchen, bathroom, bedroom, living room, living room, children's room, garden, balcony, etc. Each group is divided into sub-groups in its own group and determines the topics to be researched. (To prevent light pollution; area, colors, furniture, lamp shapes, windows, light emitting devices, etc.) Each group investigates the effect of its own area on lighting. Groups that specialize in their own field return to their first group. Thus, a group plans each part of the house.

4. STAGE PROTOTYPE CREATION: (30 min.)



5. PHASE TRIAL: (10 min)

The model is checked. Corrections are made if necessary.

Is the width of the rooms and the width of the windows sufficient for lighting?

Have the locations for the lamps been chosen correctly?

Are the lamps oriented correctly?

Is the interior paint of the house suitable for low lighting?

Is the placement and color of furniture suitable for low lighting?

6. STAGE PROTOTYPE PRESENTATION: (20 min)

All groups present their products and observe whether the model causes light pollution or not by lighting it with a flashlight etc.

7. STAGE EVALUATION: (10 min)

All groups evaluate and score the products of the other groups according to the evaluation rubric.

Rubric - 1

Group Evaluation Rubric					
CRITERIA	**Very Good - 4 Points**	**Good - 3 Points**	**Medium - 2 Points**	**Should be improved - 1 point**	**Total Score**
MATERIAL USE	Original, adequate, diverse and the desired material was used.	Adequate use of visual and desired materials.	Visual materials are used but not enough.	The requested materials were not used at all, just simple drawings.	
DESIGN CREATION	It adds originality to the design and is adapted to everyday life.	Design adequate and not adapted to everyday life.	Designed by but not enough	Simple designs have been passed over.	
TIMING	Workshop held on time and presented.	The workshop was delivered after 5 minutes and the presentation was on time.	The workshop was delivered very late and the presentation was made.	Workshop very late Delivery Were but there was no presentation.	
GROUP EVALUATION	The product was designed and presented in harmony with the group members.	Group there was factionalization within it.	Group there are those who did not participate in the study.	Group work I don't have one.	

Rubric - 2

Individual Evaluation Rubric				
	5-4	**3-2**	**1**	**Score**
Understanding	The student has a good understanding of the purpose of the task.	The student partially understood the purpose of the task.	The student did not understand the purpose of the task.	
Behavior	Student participates in group discussions and contributing to studies is present. Fully fulfills the assigned task.	Student partially participates in group discussions and partially Contribution is found. Given Mission partly fulfills.	Student enough for group discussions does not participate at the level and does not contribute to the work does not fulfill the mission.	
(Out of 10) Total:				

8. STAGE DEVELOPMENT: (10 min)

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

Different with materials de our model can were we? Which materials could have been used?

Could he also install lighting in the house? How could we do that?

Evaluates the integration of the designed house into a

Researches advanced technology lighting

projects. 3D modeling can be done with

TINKERCARD.

BLOGGER can also set up a blog with its group and share information about light pollution and space designs.

Careers and professions related to the project (10 min.)

Automation engineer An automation engineer is a person who ensures that a system works as intended and planned. As the name of their profession suggests, automation engineers strive to develop new technologies by ensuring that systems work with the help of automation. They design and install smart home systems for buildings.(Kariyer.net,2021)

Environmental Engineer: Environmental engineer works for the best use of natural resources, planning production and consumption activities in a way that does not harm human health, welfare and natural balance.(Kariyer.net,2021)

Smart city specialist: People who use technological tools to improve people's quality of life and ultimately create more sustainable cities.

SOURCE:

- Eba (2020) Grade 4 science; light pollution video Access date:04.12.2020 https://ders.eba.gov.tr/ders/proxy/VCollabPlayer_v0.0.737/index.html#/main/curriculumResource?resourceID=51dd1f6ae38afefddc76caa52c010375&resourceTypeID=3&loc=0&locID=462f4bbff0b26bdc0809de9d895c569f&showCurriculumPath=false
- Eba (2020) Grade 4 Science; preventing light pollution video Access date: 04.12.2020 https://ders.eba.gov.tr/ders/proxy/VCollabPlayer_v0.0.737/index.html#/main/curriculumResource?resourceID=8242149e9ae853e147ce275f0f83e87c&resourceTypeID=3&loc=0&locID=462f4bbff0b26bdc0809de9d895c569f&showCurriculumPath=false
- TUG Tubitak (2020) Lightpollution and Energy saving Access Date: 05.12.2020 https://tug.tubitak.gov.tr/sites/images/tug/isik_kirliligi.html
- Pehlivanoglu,Poyraz (2015) Light environment impacts mi. Access Date: 03.12.2020 https://pt.slideshare.net/poyrazpehlivanoglu/k-evreyi-etkiler-mi/8
- Aslan İlbey Atay (2011) Light Pollution Date of Access: 03.12.2020 https://pt.slideshare.net/ilberatayaslan/isik-kirliligi-son?next_slideshow=1
- Aydınlatma.org (2019) Lighting Ergonomics. Access date:01.12.2020 https://www.aydinlatma.org/aydinlatma-ergonomisi.html
- E.okul.org (2020) Causes of light pollution, Date of access: 03.12.2020 https://e-okul.org/isik-kirliliginin-nedenleri.html
- Yaman. E, Akan.R., Doğan M., Sarı, Ö (2020) Primary School Science 4th Grade Textbook. Izmir: Çağlayan
- Lalılu TR(2020) DIY Miniature Dollhouse in a Shoe Box. Access Date 06.12.2020 https://www.youtube.com/watch?v=eIWdyEuHb_Q

Evaluates the integration of the designed house into a

- Kariyer.net(2021) What is an environmental engineer? Access date.:17.01.2021 https://www.kariyer.net/pozisyonlar/cevre+muhendisi/what-is
- Kariyer.net(2021) What is an automation engineer? Access date: 10.01.2021 https://www.kariyer.net/pozisyonlar/otomasyon+muhendisi/what-is

My Own Carpet

Course Title:	Mathematics	Subject:	Geometry

Mathematics Outcomes:

M.3.2.1.4. Recognizes that shapes are named according to the number of sides

M.4.2.1.5. Constructs simple structures in accordance with the models drawn with equal cubes on isometric or squared paper.

M.4.2.2.2. Draws the symmetry of the given shape according to the line.

M.4.2.3.1. Recognizes and exemplifies the plane.

M.4.3.3.1. The areas of figures are the number of unit squares that cover this area. Determinations.

Visual Arts Outcomes:

G.3.1.4. Uses geometric and organic forms in observation-based drawings.

G.3.1.7. Uses art elements and design principles while creating visual art works.

G.3.3.1. Recognizes the motifs of local culture.

G.4.1.3. Choices to create unity of composition in visual art work
It does.

Engineering Gains:

1. Ability to identify, formulate and solve engineering problems.
2. Ability to communicate effectively.

Learning and Innovation Skills

1. Uses various idea generation techniques (brainstorming, six hats, discussion, etc.)

Critical Thinking and Problem Solving

1. Solve different unconventional problems in both traditional and innovative ways.

1. STAGE SCENARIO: (10 min)

Gökalp, who loves math and geometric shapes, went shopping with his mother to buy a carpet for his room. Going from shop to shop, Gökalp and his mother could not find the carpet they wanted. But only one carpet was to be bought and it had to be the one Gökalp wanted. Finally, they reluctantly bought the carpet that his mother liked. When Gökalp came home, he thought about what to do. I wish I could make my own carpet. He was bored, he turned on Eba TV and was about to start the lesson when he saw the documentary on carpet making on the shuttle in Gaziantep and lightning flashed in his mind. He started to produce ideas with excitement that I could make my own carpet, I could make its color, shape and

design. He bought

He started to write and draw with pen and paper.... He started to study and research how to make carpets and what they need....

2. PHASE PROBLEM: (5 min)

Which colors to use?

Which shapes to use

Which yarns are more durable?

How big should it be?

Ingredients:

- Board
- Nail
- Comb,
- Colored threads,
- Scissors,
- Geometric shapes

3. STAGE IDEA GENERATION: (30 min)

(Ideas are generated about the problem situation. All ideas are noted. The idea is determined by voting.

Using various idea generation techniques, students are expected to propose solutions to the problem-need.

The applicability of the solution proposals they produce is discussed.

One of the solution proposals is selected according to the results of the evaluation. It is emphasized that the design should reflect the solution in the best way.

Show the following videos or videos on similar topics to the children:

Example video for hammering nails into wood: https://www.youtube.com/watch?v=sdJ- 3icA1uo

Video example of how to weave a carpet:

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

You have seen how to make carpets and rugs in the videos we watched. I wonder, if you were a carpet designer, what kind of carpet would you design?

4. STAGE PROTOTYPE CREATION: (25 min)

The design is concretized through the idea produced. (Drawing)

Students are divided into groups. Materials provided by the teacher and students are checked on the tables. It is checked whether safety precautions are taken. Students are then asked to design a birdhouse.

Design Planning:

Students are asked to plan their designs with the available materials. They are

asked to present the plans of the created drafts to the class.

The prototype is drawn on A4-A5 paper or gridded paper,

The drawing should clearly describe the features of the design and explain how the design will work.

Figure 1. https://pixnio.com/tr/cesitli/hali-yun-doku-desen-tekstil-moda-tasarim-retro#

Image.2. https://pxhere.com/tr/photo/1023059

Making the Design:

First, the nails are hammered on the board at the desired distances (with the help of the teacher and / or parent).

The opposite ropes are tied tautly to the nails and fixed.

Colorful threads are passed by skipping between the taut threads.

The desired geometric shapes or patterns are made slowly.

Students talk about the airplane models they designed and what they learned during the activity. Anything that attracts their attention is learned.

Limitations

Duration two weeks, two class hours each

The materials used should be used at a minimum level according to the given materials.

Occupations

Carpet Designer

Design-Planning

Duties and

Responsibilities

Writer

Spokesper

son

Researcher

Designer

5. PHASE TRIAL: (10 min)

The prototype is tested and its operation and functioning are checked. Corrections if necessary
It is done.

Designs between groups are displayed before the experiment. You can share your own product with other
Groups that compare their products with the products of other groups may feel the need to improve their products. Groups can make changes to their products by taking additional time.

6. STAGE PROTOTYPE PRESENTATION: (20 min)

All groups present their products and are observed to see if they have done the given task.

Groups share their finalized products with the class through group spokespersons.

Our aim is to compare the products of the groups with others and to ensure that learning takes place in a friendly environment in order for the design to be successful.

School administrators can prepare posters to inform parents and other students in the school.

7. STAGE EVALUATION: (10 min)

The Whole groups other groups products evaluation rubric evaluates and scores them accordingly.

Rubric-1

Group Name	Geometric Shapes (1)			Design			Ranking-Result
	Should improve	Good.	Very good	Should improve	Good.	Very good	

The number of geometric shapes and the smoothness of the geometric shapes are measured. In the ranking, the group or groups that score very well 2 times come first.

Rubric-2

Group A	Should improve (1-2)	Medium (3)	Good (4)	Very good (5)
Problem identify, analyze and research				
Developing possible solutions for the problem and Selection				
Prototyping				
Testing the prototype and evaluation				
Sharing Solutions				
TOTAL				

According to the Rubric, a student can get a minimum of 5 points and a maximum of 25 points.

5-10 points Needs improvement, 11-15 points Fair, 16-20 points Good, 21-25 points A score of between is considered Very good.

8. STAGE DEVELOPMENT:(10 min)

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

After the prototype presentation, the groups can compare their own products with the products of other groups and discuss what can be done to improve the designs or to design different products.

After the discussion, groups that feel the need can improve their designs.

Regroup the children if necessary. Have the students tell you what worked and what didn't work. Have them redo the designs.

9.SOURCE:

- Kılıç, Karatay, S. (2018). Design in Carpet Weavings. Ulak Bilge, 6(22), p.321-354
- Ministry of National Education Science Curriculum, Ankara, 2018.
- Ministry of National Education Mathematics Curriculum, Ankara, 2018.
- Ministry of National Education Life Science Course Curriculum, Ankara, 2018.
- Ministry of National Education Preschool Curriculum, Ankara, 2013.
- Ministry of National Education (2018). Curriculum Monitoring and Evaluation System: Retrieved from http://mufredat.meb.gov.tr/
- Ministry of National Education Turkish Lesson Teaching Program, Ankara, 2018.
- Ministry of National Education General Directorate of Innovation and Educational Technologies. (2018). STEM Education Teacher's Handbook. Ankara: Ministry of National Education.
- https://pixnio.com/tr/cesitli/hali-yun-doku-desen-tekstil-moda-tasarim-retro# (accessed on 24.01.2021)
- https://pxhere.com/tr/photo/1023059 (accessed on 24.01.2021)

- https://www.youtube.com/watch?v=ZQOAbTXCHpE (accessed on 24.01.2021)
- https://www.youtube.com/watch?v=sdJ-3icA1uo (accessed on 24.01.2021)

Kuşhane (Bird House)

Course Title:	Life Science	Subject:	Life in Nature

Life Science Outcomes:

HB.1.6.3. Shows care to protect the animals and plants in his/her immediate environment. HB.3.6.4 Gives examples of the effects of humans on natural elements in their immediate environment. HB.3.6.5. Takes responsibility for protecting nature and the environment.

HB.3.6.6. Gives examples of the contribution of recycling to himself/herself and the environment he/she lives in.

Mathematics Outcomes:

M.3.3.2.2.Measures the perimeter length of shapes using non-standard and standard units.

M.3.3.3.3.1. Cover and measure the area of shapes with appropriate non-standard material.

M.3.3.7.1. Explains the necessity of standard liquid measuring tools and units and makes measurements with liter or half liter units.

Science Outcomes:

F.3.6.2.2. Takes an active role in cleaning the environment in which he/she lives.

F.3.6.2.5. Recognizes the importance of the natural environment for living things.

F.3.6.2.6. Proposes solutions by doing research to protect the natural environment.

F.4.6.1.2. Recognizes the importance of resources necessary for life and recycling.

Visual Arts Outcomes:

G.4.1.1. Uses the formatting steps while creating a visual art work.

G.4.1.3. Makes choices to create unity of composition in visual artwork.

Technology Gains:

Organize their own working group and environment to support the learning process.

It uses a conscious design process to generate ideas, test theories, create innovative artifacts or solve real problems.

Develop prototypes as part of an iterative design process.

Organize their own working group and environment to support the learning process.

1. STAGE SCENARIO: (10 min)

Every day, as primary school students left home and came to school, they saw a few more houses being demolished. They heard from their elders that bigger and taller houses would be built in their place. On the one hand, they were happy because their own houses would also be demolished and they would live in more comfortable and cozy houses. On the other hand, they were very sad because they used to keep cats, dogs and chicks in the garden of their houses. Now, when the high-rise houses would be built, these gardens and their huge trees would be destroyed. The trees with birds on their branches would be cut down and houses would be built instead. But what could they do? Where would the birds stay while we lived in high-rise houses? On which branch would they land and feed themselves? The children realized that there was no place to protect the birds from the sun and cold. While talking about what it would be like if birds had multi-storey houses like us, they decided to make both a place and a feeder for the birds that were hungry on cold winter days.

2. PHASE PROBLEM: (10 min)

People are looking for new ways to find solutions to the challenges animals face in nature during the winter season.

Various visual media content describing the harm to animals and plants is compiled by the teacher and shared with the students.

The following questions are asked:

What can be done for an animal that cannot afford shelter and food? How can

I do this?

What do I need for that?

I wonder how we can make a house and a feeder without harming the birds?

There are various ideas on how to create a robust, useful and functional nest for birds. questions are asked.

Opinions are sought on how to create a robust, useful and functional feed container for birds.

Materials: Utility knife, cardboard, glue, plastic bottle, tire, skewer, straw

3. STAGE IDEA GENERATION: (20 min)

(Ideas are generated about the problem situation. All ideas are noted. The idea is determined by voting.

Using various idea generation techniques, students are expected to propose solutions to the problem-need.

The applicability of the solution proposals they produce is discussed.

One of the solution proposals is selected according to the results of the

evaluation. It is emphasized that the design should reflect the solution in

the best way.

Show the children the pictures given below or on a similar subject:

https://fi.pinterest.com/pin/562950022155131566/?amp_client_id=CLIENT_ID(_)&mweb_unauth_id={{{default.session}}}&simplified=true

http://experimentexchange.com/living-systems/make-bird-feeders-from-recycled-materials/

https://www.eba.gov.tr/haber/1574323413

https://www.shutterstock.com/tr/image-photo/care-protection-animals-starlinghouse-natural-wood-795319126

In the videos we watched, you saw how to build a birdhouse. How would you design a place for birds?

4. STAGE PROTOTYPE CREATION: (40 min)

The design is concretized through the idea produced. (Drawing)

Students are divided into groups. Materials provided by the teacher and students are checked on the tables. It is checked whether safety precautions are taken. Students are then asked to design a birdhouse.

Design Planning:

Students are asked to plan their designs with the available materials. They are

asked to present the plans of the created drafts to the class.

The prototype is drawn on A4-A5 or gridded paper,

The drawing should clearly describe the features of the design and explain how the design will work.

Making the Design:

Square and rectangular shapes are cut out of cardboard and joined together to form a house.

The square shapes have windows large enough for birds to enter and exit easily.

Then the top of the 5-liter bottle is cut off and placed on the roof of the house to protect it from the rain.

Large size bottles are available (5liters if possible)

In the center of the bottle, windows are opened so that the birds can eat their feed comfortably.

Figure 1.

https://pixabay.com/tr/photos/ku%C5%9F-yuvas%C4%B1-dam%C4%B1zl%C4%B1k-kutusu-266507/

Pieces of branches are placed under the windows where birds can land.

A feed bottle is tied under the house and fixed. It is made ready for use.

Students talk about the bird nests they designed and what they learned during the activity.

Limitations

Duration 2 weeks 2 class hours each

The materials used should be used at a minimum level according to the given materials.

Occupations

Urban Designer

Design-Planning

Duties and

Responsibilities

Printer

Spokesper

son

Researcher

Designer

5. PHASE TRIAL: (20 min)

The prototype is tested and its operation and functioning are checked. Corrections are made if necessary.

Designs between groups are exhibited before the experiment. Groups that compare their products with the products of other groups may feel the need to improve their products. Groups can make changes on their products by taking additional time.

School administrators can prepare posters to inform parents and other students in the school.

6. STAGE PROTOTYPE PRESENTATION: (20 min)

All groups present their products and are observed to see if they have done the given task.

Groups share their finalized products with the class through group spokespersons.

Our aim is to compare the products of the groups with others and to ensure that learning takes place in a friendly environment in order for the design to be successful.

7. STAGE EVALUATION: (20 min)

The Whole groups other groups products evaluation rubric evaluates and scores them accordingly.

Rubric-1

Group Name	Benefit-Performance			Design			Ranking - Result
	Should improve	Good.	Very good	Should improve	Good.	Very good	

1. In the ranking, the group or groups that do very well 2 times will come first.

Rubric-2

Group A	Should improve (1-2)	Medium (3)	Good (4)	Very good (5)
Problem identify, analyze and research				
Developing possible solutions for the problem and selection				
Prototyping				
Testing the prototype and evaluation				
Sharing Solutions				
TOTAL				

According to the Rubric, a student can get a minimum of 5 points and a maximum of 25 points.

A score of 5-10 is rated as Needs improvement, 11-15 as Fair, 16-20 as Good, and 21-25 as Very good.

8. STAGE DEVELOPMENT:(20 min)

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

After the prototype presentation, the groups can compare their own products with the products of other groups and discuss what can be done to improve the designs or to design different products.

After the discussion, groups that feel the need can improve their designs.

Regroup the children if necessary. Have the students tell you what worked and what didn't work. Have them redo the designs.

9.SOURCE:

- Kılıç, Karatay, S. (2018). Design in Carpet Weavings. Ulak Bilge, 6(22), p.321-354
- Ministry of National Education Science Curriculum, Ankara, 2018.
- Ministry of National Education Mathematics Curriculum, Ankara, 2018.
- Ministry of National Education Life Science Course Curriculum, Ankara, 2018.
- Ministry of National Education Preschool Curriculum, Ankara, 2013.
- Ministry of National Education (2018). Curriculum Monitoring and Evaluation System: Retrieved from http://mufredat.meb.gov.tr/
- Ministry of National Education Turkish Lesson Teaching Program, Ankara, 2018.
- Ministry of National Education General Directorate of Innovation and Educational Technologies. (2018). STEM Education Teacher's Handbook. Ankara: Ministry of National Education. https://www.eba.gov.tr/haber/1574323413 (accessed on 24.01.2021)
- http://experimentexchange.com/living-systems/make-bird-feeders-from-recycled-materials/ (accessed on 24.01.2021)
- https://fi.pinterest.com/pin/562950022155131566/?amp_client_id=CLIENT_ID(_)&mweb_unauth_id={{{default.session}}}&simplified=true (accessed on 24.01.2021)
- https://pixabay.com/tr/photos/ku%C5%9F-yuvas%C4%B1-dam%C4%B1zl%C4%B1k-kutusu-266507/ (accessed on 24.01.2021)
- https://www.shutterstock.com/tr/image-photo/care-protection-animals-starlinghouse-natural-

5

wood-795319126 (accessed on 24.01.2021)

5

Matter Cycle

Course Title:	Science	Subject:	Material Cycles and Environmental Problems

Science

F.8.6.3.1. Explains the cycles of matter by showing them on the diagram.

F.8.6.3.2. Question the importance of matter cycles for life.

F.8.6.3.3. Discusses the causes and possible consequences of global climate change.

Social Studies:

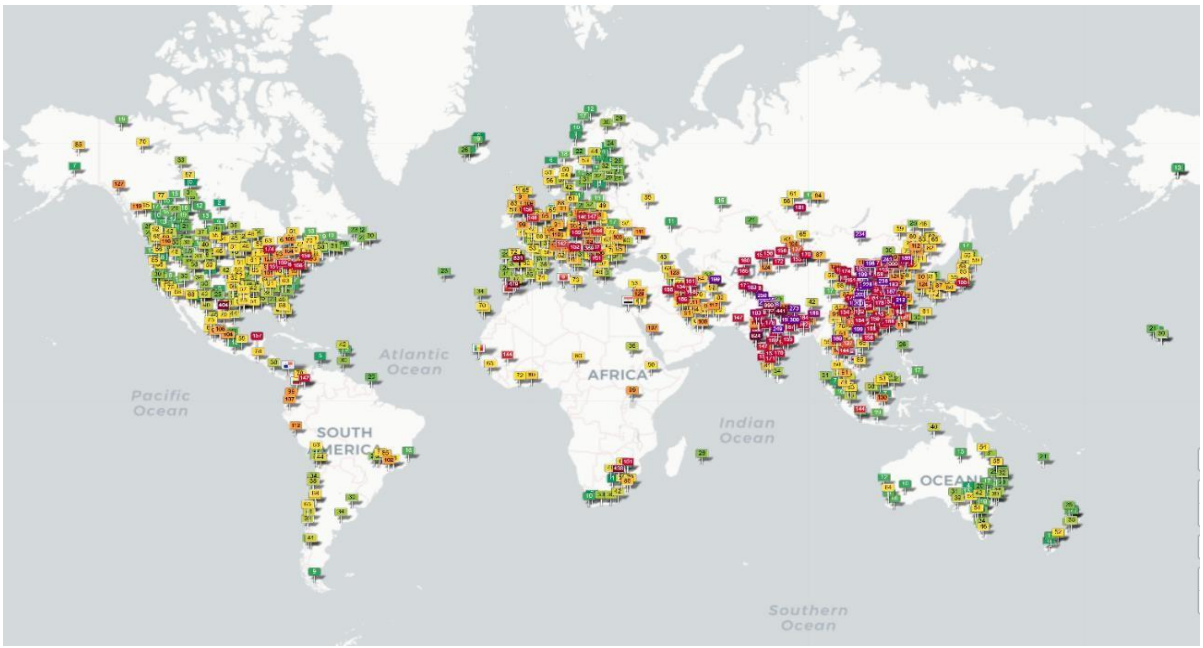
SB.7.4.1. Examines change and continuity in the protection, dissemination and transfer of knowledge.

Technology Design

TT. 7. Ç. 1. 1. 1. Explains the technologies for obtaining clean and sustainable energy by using natural resources such as water, wind and sun.

TT. 7. Ç. 1. 2. Designs a product that can obtain energy through natural resources.

1. STAGE: SCENARIO: (20 min.)



World Air Pollution Index (AQI) information. https://waqi.info/tr/ accessed on 8.11.2020.

The picture above is opened in the classroom and students are asked questions about the meaning of the map and what the colors mean. By accessing the page with a smart board or projector, real-time data of different cities are examined.

The causes of air pollution in Turkey are discussed and the pollution rates of different cities are discussed.

Ministry of Environment and Urbanization Air National Air Quality Monitoring Network

(https://sim.csb.gov.tr/Services/AirQuality?type=0) to examine real-time data on air pollution.

A 10-minute documentary prepared by TRT Documentary is shown in which information about air pollution in Turkey is given.

(https://www.youtube.com/watch?v=KdJxuQ0pof4&t=501s&ab_channel=TRTBelgesel.

2. PHASE: PROBLEM: (20 min.)

Air pollution is among the world's most important problems. The work to be done in this field will affect not only us, our city or our country, but the whole world. Polluted air can adversely affect important elements such as plants and climate balance, especially the people and animals breathing that air.

Carbon dioxide emission, which is one of the causes of air pollution, occurs mainly in factories, vehicles and our homes that we use for shelter. Architect Sinan, who realized this problem centuries ago, invented and implemented the idea of the "soot room" while building the Süleymaniye Mosque, based on the idea that the gas emitted during the lighting of gas lamps would not damage the architectural texture and the structure of the mosque. For centuries, the gases emitted from the burning lamps did not damage the structure and the artistic works on the structure.

Today, there are many similar studies on ventilation of buildings and filtering of polluted gases. However, these studies cannot be fully effective for different reasons. This shows the increase in the pollution level of the air in the world.

Have you ever heard of HVAC Engineer? This field has been developing in recent years and will become more important in the future. This engineering specializes in ventilation systems. Engineers generally work in a team, not individually. Engineering products are formed with other assignments working outside the engineer such as accounting, social relations, communication specialist, field staff.

I want you to design a structure. Assume that within this structure, you have established a team, a company that undertakes different professions and tasks, including the HVAC engineer.

2 elements will be very important in your work for your customers.

Ventilation system (different apartments, rooms, workspaces if it is a factory) field)

Ventilation system filter

3. STAGE: IDEA GENERATION: (20 min.)

Ideas are generated about the problem situation. All ideas are noted down. Idea by voting Determined.

Each group determines the details of the work to be done within the group, according to the majority of the group, based on the ideas of the people in the group.

The structure to be built. (Factory, Shopping Mall, Apartment, School,

Mosque, Hospital, etc.) The method to be used in the ventilation system.

Filtering system design.

At this stage, students are asked to conduct research (they can do it individually or together outside the classroom as project work) and to make use of scientific resources and practices. Some resources are recommended for students to make use of.

http://www.fatih.gov.tr/suleymaniye-

camii

https://www.youtube.com/watch?v=XE-6RMRDWoA&ab_channel=ElaproSAHNE

http://nermintaylan.blogspot.com/2013/07/suleymaniye-camiindeki-sis- odas.html

https://www.alarko-carrier.com.tr/Upload/Newsletter/c47425a3-55c9-460f- 81cb-980fb1d6a2ef.pdf

http://www.isgum.gov.tr/rsm/file/isgdoc/IG6-havalandirma_rehberi.pdf

https://www.ulpatek.com/wp-content/uploads/2019/11/Ulpatek-Genel-Filtre-Katalo%C4%9Fu-2019.pdf

http://www.tasot.com.tr/filtre/havaaritimyontemlerisunum.pdf

4. STAGE: PROTOTOTYPE CREATION: (40 min.)

The design is concretized through the idea produced.

(Drawing) The plan of the house is drawn.

The structure and contents of the filtering system are drawn.

3D design is started.

Cardboard, paper, computer fan, 12-volt adapter or battery, glue, activated carbon, etc.

5.STAGE: TRIAL: (5 min.)

The prototype is tested and its operation and functioning are checked. Corrections if necessary
It is done.

STAGE 6: PROTOTYPE PRESENTATION:

All groups present their products and are observed to see if they have done the given task.

	Very good 3 Points	Successful 2 Points	Improvement Required 1 point
Presentation Capability	They can elaborate on the product, use body language well and communicate with the audience. ( )	Excited during the presentation but has sufficient knowledge about his/her subject and can complete the presentation on time. ( )	Excited and does not know / cannot express important information about the project. Also uses too little/too much time. Does not interact in any way. ( )
Intergroup Communication	The group is a preliminary study of the interaction and working environment in everyday life. There should be identification of tasks in the group, fulfillment/questioning of tasks in the process and joint decision-making. ( )	The group came together to do a specific task and completed the task and responsibility together. There is poor communication or cooperation between them. ( )	The group did not define tasks among themselves and did not react to tasks that were not done. There may be conflicts in this process, but if these conflicts are not resolved, the group skill is evaluated negatively. ( )
Time Management	Time management was applied correctly from the beginning to the end of the process in all individual and group assessments, and deadlines and deadlines were met. ( )	Attention was paid to the time management process, but disruptions and delays occurred due to different reasons. ( )	Dates were not set, were not respected or the mission never materialized. ( )
Article Cycles and Environmental Problems	Explains matter cycles on the diagram, questions their importance for life, discusses the causes and possible consequences of global climate change. ( )	Partially fulfilled the learning outcomes related to Material Cycles and Environmental Problems. ( )	Acquisitions related to Material Cycles and Environmental Problems are not at a sufficient level. ( )
Science, Technology and Society	It examines change and continuity in the preservation, dissemination and transfer of knowledge. ( )	Partially fulfilled the learning outcomes related to science, technology and society. ( )	Acquisitions related to science, technology and society are not at a sufficient level. ( )
Energy Transformation and Design	Explains clean and sustainable energy production technologies. Designs a product that can obtain energy through natural resources. ( )	Partially fulfilled the learning outcomes related to energy transformation and design. ( )	Gains related to energy transformation and design are not at a sufficient level. ( )
...			
Total			

STAGE 7 EVALUATION: (10 min)

All groups evaluate and score the products of the other groups according to the evaluation rubric.

Members of the Evaluating Group	Presentation order and stages studied in advance. During the presentation, the audience and Interaction they can build.	The group works well together and has good communication There is.	The content of the product they offer meets the objectives and requirements.	Product the effort and work done in the process of designing the subjects, the way of working is successful.

8. STAGE: DEVELOPMENT:(5 min.)

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

9. SUGGESTIONS FOR THE TEACHER:

If there are air filtration systems within the reach of our students (buildings, workplaces of family or relatives, etc.), visits can be organized to these areas and questions can be asked about the details and filtration.

Support can be obtained from 3D printers, and if there is no access to a printer, the projects to be determined can be exhibited in any of the institutions that take paid 3D prints.

Drawing the system is as important as air filtration. Here, technical drawing details should be included and it should be easier for students to read the technical drawings as a result of this study.

SOURCE:

- https://www.abccevre.com/hava-kirliligi-haritasi-aciklandi.html
- https://waqi.info/tr/
- https://sim.csb.gov.tr/Services/AirQuality?type=0
- https://www.buildingscience.com/documents/digests/bsd-014-air-flow-control-in-buildings
- https://mam.tubitak.gov.tr/tr/teknoloji-transfer-ofisi/bacagazi-aritma-sistemleri
- http://www.fatih.gov.tr/suleymaniye-camii
- https://www.youtube.com/watch?v=XE-6RMRDWoA&ab_channel=ElaproSAHNE
- http://nermintaylan.blogspot.com/2013/07/suleymaniye-camiindeki-sis- odas.html
- http://www1.mmo.org.tr/resimler/dosya_ekler/137adc331dcfb9e_ek.pdf?dergi=1187

STAGE 7 EVALUATION: (10 min)

- https://www.instructables.com/Activated-Carbon-Air-Filter/

Light a Candle in the Dark

Course Title:	Science	**Subject:**	Design and Technological Solution

Technology and Design Lesson Outcomes

TT. 7. Ç. 1. 1. 1. Explains the technologies to obtain clean and sustainable energy by using natural resources such as water, wind and sun.

TT. 7. D. 1. 4. Creates a model or prototype of the design.

TT. 7. D. 1. 5. Evaluates the design according to the specified criteria.

TT. 7. D. 1. 6. product evaluation Conclusions According to restructures.

TT. 7. D. 2. 1. Presents the product or products to be exhibited.

Science Outcomes

F.8.7.3.1. Gives examples of applications where electrical energy is transformed into heat, light and motion energy.

F.8.7.3.2. Design a model based on the transformation of electrical energy into heat, light or motion energy. First of all, they are asked to express their designs by drawing. If the conditions are appropriate, they may be asked to convert it into a three-dimensional model.

Mathematics Outcomes

M.7.4.1.1. Creates and interprets line graphs related to the data.

M.7.4.1.2. Finds the mean, median and peak value for a data group and Comments.

M.7.4.1.3. Constructs and interprets a circle graph for a data group.

M.7.4.1.4. Shows data in column, circle or line graphs and makes appropriate transformations between these representations.

Information Technologies and Software Lesson Outcomes

BT.5.4.1.1. Knows image file formats.

BT.5.4.1.2. Carries out editing processes related to visuals.

STAGE 1 SCENARIO: (10

Electricity has been researched since antiquity, with theoretical understanding dating back to about the seventeenth and eighteenth centuries. Even then, practical applications were few and far between and it was only in the 19th century that electricity became available for widespread use in industry. Electricity has a very large pervasiveness, i.e. electricity is widely used in transportation, heating, lighting, communication and technological devices. as a power source. Electrical power is currently one of the most important resources in industry.

It is possible to understand our connection with electricity by looking around us. The phone we set the alarm to get up in the morning, the refrigerator that stores the food we need to eat, the television we watch while having breakfast, the first ignition system of the vehicle we get on on the way to school, the bell that announces the start of school, the smart board with many content, many tools at different levels work with electricity, making us dependent on electricity.

There are many sources for obtaining electricity. These sources and methods of obtaining electricity can be divided into 2 main categories: Exhaustible and renewable (inexhaustible) resources. Water, solar, wind and geothermal sources are called renewable energy sources. These resources are inexhaustible like the others. Substances such as oil, natural gas, coal and uranium will run out in the next few centuries.

It is a big fact that we will not give up the electricity we need everywhere in our lives. The electricity we currently use is largely obtained from exhaustible resources. From time to time, if we do not have a tool such as a generator when the electricity is cut off, our lives are negatively affected in a very negative way. Especially workplaces, schools and institutions that perform their duties as a result of their work with electricity are more affected in these situations.

It is a known fact that resources will run out and inexhaustible resources are already waiting for us. Therefore, we should work towards electricity generation with renewable energy sources. This will ensure a more conscious use of resources and reduce some of the global problems caused by consumption.

2. PHASE PROBLEM: (10 min.)

Ökkeş, who lives in Nurdağı district of Gaziantep city, wakes up in the morning and realizes that there is no electricity. Since it is not yet fully lightened, he gets ready to go to school with the first rays of the rising sun, has breakfast and walks down 10 floors because the elevator does not work. When he arrives at school, there is no electricity, so he cannot work with the robotic software application he is preparing to present in the first lesson, the Information Technologies and Software lesson. They discuss the frequent power cuts with their teachers and want to find a solution to this problem. By realizing the solution they find, they will create an alternative to the

STAGE 1 SCENARIO: (10
blackouts in their schools.

Here, students should be encouraged to take on professions such as natural scientist, renewable energy engineer, energy use consultant, etc., which will increase in importance in the future with energy and electricity. These professions could include electrical and electronic engineering, communication specialists or materials engineers, which are also available today.

This problem is experienced by many people in our country. The issues to be researched and the studies to be implemented to solve the problem are as follows;

Investigate the information obtained through studies on electricity centuries ago and the use of this information in the field of life.

Examine the process of the emergence of electricity used today, the developments in the world and Turkey after the discovery of electricity.

Research the resources used for electricity generation in the world, their locations and potentials and turn them into visuals and tables.

Conduct research on global problems caused by electricity consumption and formulate ideas on how to reduce these problems.

Identify the tools that will need electricity at home, school and workplaces of different professions and create a report on the estimated electricity consumption of these places for 1 day.

Research renewable electricity generation methods, the area in which they are used and the conditions for their use.

What are the suggestions for renewable electricity generation methods in different regions and cities in Turkey, with priority to the region where our school is located?

There are no renewable electricity generation activities to be used in the school district.

3. STAGE IDEA GENERATION: (20 min.)

Students are divided into groups of 5. Each group carries out report, presentation and design studies by collaboratively researching the problems specified as a priority. As the last stage, each group shares their work by working in cooperation for the renewable electricity method-tool to be used in the school district, which is also among the problems.

4. STAGE PROTOTYPE CREATION: (80 min.)

After each group has shared their ideas, the groups can change the practices they have previously identified with the joint decisions they will take as a group.

Students research the following topics individually, in groups or with teacher guidance, according to their means.

How to determine the amount of electricity consumed

in an area?

https://www.ckbogazici.com.tr/tr/tuketim-hesaplama

Energy Classification:

http://www1.mmo.org.tr/resimler/dosya_ekler/728306c33e38495_ek.pdf

Renewable Energy Sources.

https://www.enerjiportali.com/yenilenebilir-enerji-kaynaklari-nelerdir/

Once this information is shared;

In the school environment, the vehicles that need priority energy are identified and their consumption is determined. By examining the energy classification of existing systems, it may be recommended to prefer alternative products that consume less energy.

The scope needed to produce 1 day's worth of electricity with the identified renewable energy source is determined.

An alternative renewable electricity source is designed to meet the needs.

Drawing Groups concretize their renewable energy designs. In this process, paint, paint3D, AutoDraw or tinkercad tools are used. The design should include the devices to be used and their placement, the school structure, the area where the renewable energy system will be installed and the renewable energy system.

If you do not have access to digital tools, you can draw on a white sheet of paper. Next to the devices that consume electricity, you should calculate and indicate their consumption for 1 day.

Physical Design: Each group turns the design they have drawn into a 3D structure in line with the ideas they have received. In this process, materials such as a cardboard box, glue and scissors are mandatory for the main design, but they can choose alternative materials to these materials and other materials needed for their designs in line with their imagination. If the planned material is not available, a design to be drawn on colored paper or printed out can be used by covering a hard object.

5. STAGE TRIAL:(10 min.)

The prototype is tested and its operation and functioning are checked. Corrections if necessary
It is done.

Electricity consumption and production in the drawing and product created during this trial process,
Processes such as production-storage-transfer of energy to consumption are reviewed. New and different information learned in the process is discussed and remembered within the group. All the points examined in the trial phase are shared in the presentation phase, this phase is a preliminary meeting for the presentation.

6. STAGE PROTOTYPE PRESENTATION: (20 min.)

All groups present their products and are observed to see if they have done the given task.

	Very good 3 Points	Successful 2 Points	Improvement Required 1 point
Presentation Skills	They can elaborate on the product, use body language well and communicate with the audience. ( )	Excited during the presentation but has sufficient knowledge about his/her subject and can complete the presentation on time. ( )	Excited and does not know / cannot express important information about the project. Also uses too little/too much time. Does not interact in any way. ( )
Between Group Contact	Group in daily life interaction and work is a preliminary study of the	Group doing a specific task to come together for a mission and responsibility together	Tasks among the group definition, tasks not performed

	environment. Tasks in the group identification, in the process fulfillment of tasks being brought/questioned situation and joint decision-making must exist. ( )	has completed it. Between them communication or cooperation status is weak. ( )	reaction against did not show. In this process There may be conflicts, but this if the cracks are not resolved group skill negatively is evaluated. ( )

	Very good 3 Points	Successful 2 Points	Improvement Required 1 Point
Time Management	Time management was applied correctly from the beginning to the end of the process in all individual and group assessments, and deadlines and deadlines were met. ( )	Attention was paid to the time management process, but disruptions and delays occurred due to different reasons. ( )	Dates were not set, were not respected or the mission never materialized. ( )
Design and Technological Solution	Design and Technological Solution is completely fulfilled. ( )	Partially fulfilled the learning outcomes related to Design and Technological Solution. ( )	Acquisitions related to Design and Technological Solution are not at a sufficient level. ( )
Transformation of Electrical Energy	Conversion of Electrical Energy is completely fulfilled ( )	Partially fulfilled the objectives related to the Transformation of Electrical Energy. ( )	Acquisitions related to the Transformation of Electrical Energy are not at a sufficient level. ( )
Data Analysis	The learning outcomes related to Data Analysis were fully met. ( )	Partially fulfilled the objectives related to Data Analysis. ( )	Their achievements related to Data Analysis are not at a sufficient level. ( )
Visual Processing Programs	Visual Processing Programs are fully implemented ( )	Partially fulfilled the objectives related to Visual Processing Programs. ( )	Their achievements related to Visual Processing Programs are not at a sufficient level. ( )
...			
Total			

7. STAGE: EVALUATION: (10 min.)

The Whole groups other groups products evaluation rubric evaluates and scores them accordingly.

Rubric 1

Members of the Evaluating Group	Presentation order and stages studied in advance. During the presentation, the audience and Interaction they can build.	The group works well together and they have good communication.	The content of the product they offer meets the objectives and requirements.	Product the effort and work done in the process of designing the subjects, the way of working is successful.

STAGE 8 DEVELOPMENT: (10

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

It determines the sector activities and sales policy for the distribution of studies such as reports, designs and applications and for them to become an economic resource.

9. SUGGESTIONS FOR TEACHERS

The focus of this lesson plan is to explain that in the future our immediate environment will have renewable energy designs that generate their own electrical energy. With 3D printers and increasing knowledge, this is not too far away. It also focuses on making students aware of the consumption of all kinds of energy-demanding tools that they use and that are used in their environment.

While implementing this plan, a potentiometer can be brought to the classroom to measure the electric currents of different circuits and tools. In addition, tools used at home or in different work areas can also be included in the plan.

Students are asked to compare the electricity bills of the previous months,

SOURCE:

- https://tr.wikipedia.org/wiki/Elektrik
- https://www.taek.gov.tr/ogrenci/bolum2_02.html#:~:text=Elektrik%2C%20bak%C4%B1r%20gibi%20iletken%20bir,elektrik%20ak%C4%B1m%C4%B1%20%C3%BCreten%20bir%20makinad%C4%B1r.
- https://www.theaa.com/home-insurance/advice/storm-power-cut-tips
- https://www.ckbogazici.com.tr/tr/tuketim-hesaplama
- http://www1.mmo.org.tr/resimler/dosya_ekler/728306c33e38495_ek.pdf
- https://www.enerjiportali.com/yenilenebilir-enerji-kaynaklari-nelerdir/

Journey Between Planets

Course Title:	Science	Subject:	Solar System and Eclipses / Earth and Universe

Science Outcomes:

F.6.1.1.1. Compare the planets in the solar system with each other.

F.6.1.1.2. Sun in the system planets, To the sun their closeness creates a model by sorting according to the order.

F.6.3.2. Constant Velocity Movement

F.6.3.2.1. Defines speed and expresses its unit.

F.6.3.2.2. Shows the relationship between path, time and speed on a graph.

Mathematics Outcomes:

M.6.4.1. Data Collection and Evaluation

M.6.4.1.1. Formulate research questions that require comparing two sets of data and obtains appropriate data.

M.6.4.1.2. Shows the data of two groups in a binary frequency table and a column chart.

1. STAGE SCENARIO: (5 min)

The U.S. Aeronautics and Space Administration's (NASA) Osirix-Rex craft has made contact with the Bennu asteroid to collect samples.

Signals from the spacecraft, which is 330 million kilometers from Earth, show that the spacecraft will be able to reach the 500-meter-wide celestial body in a few hours, as planned. confirmed that it was able to make a one-second landing. However, it is not yet known whether the lander was able to collect samples from the asteroid's surface in this short time. The goal was to collect at least 60 g of samples from the surface.

Bennu is a very primitive celestial body. For this reason, scientists say, the sand and dust particles on the asteroid's surface could provide intriguing clues about the chemistry of the formation of the Sun and planets 4.5 billion years ago.

NASA's Thomas Zurbuchen said, "This was a milestone of the mission. Now, in a few days, we'll know how much of the samples we've been waiting years for." It will take until 2023 for the samples supposedly collected by the rover to reach Earth. The landing took 4 and a half hours. Osiris-Rex sensors transmitted to the control center that all phases of the mission were successfully completed.

"Asteroids like Bennu formed very early in the Solar System," says Sara Russell of the Natural History Museum in London. They are basically the building blocks of the planets, time capsules that can explain the formation of the Sun and the planets. Bennu could really help us understand what happened during the formation process."

Osiris-Rex: NASA spacecraft successfully made contact with asteroid to collect samples. - BBC Turkish

2. PHASE PROBLEM: (5 min.)

It is a tool whose purpose is to collect samples of 60 g, about 1 teaspoon of sugar, and for this purpose it needs billions of dollars in total and many years of action. We, too, spend money and time to meet our needs, whether they are small, small amounts or large, large amounts. For example, buying bread from a bakery is costly and time-consuming. For a nuts seller to go to Giresun to buy hazelnuts and bring them to Gaziantep requires a different cost and time.

Imagine you work as a project development specialist at NASA. You have a problem and you have to solve it. You will send vehicles to 3 different planets in the Milky Way. The vehicles that go to the planets will go to the center of that planet and come back.

These vehicles that will travel to these planets at different distances and orbits at the same time and return at the same time must have different characteristics.

Identify 3 different planets in the Milky Way and determine their distance from Earth (light years) and the natural risks along the way (accidents, risks in space).

You have to detail the design, speed, fuel quantity and all other features of the vehicles you will send to the planets and show them on a prototype.

You have to place your vehicles at the end of 3 different sized strings attached to a stick. When you release your vehicles by pulling them back, there should be planets (you can use real pictures) waiting for them on the opposite surface, and the earth (you can use real pictures) on the side you pull.

Since they start and rotate at the same time, the time must be equal, and since there are different distances between the planets, their speeds must be different. Therefore, the vehicle that will go to the farthest planet may have higher technical specifications. You can find detailed information about space and planets on the internet. By the way, you can concretize the different distances of the planets by changing the distances of the ropes you will create in the setup.

3. STAGE IDEA GENERATION: (15 min.)

Ideas are generated about the problem situation. All ideas are noted down. Idea by voting Determined.

4. STAGE PROTOTYPE CREATION: (20 min.)

The design is concretized through the idea produced.

Recommended Ingredients:

- A rolling pin or similarly shaped cylindrical stick.
- Rope (2 Meters)
- Plastic Bottle
- Battery
- Adhesive
- Scissors
- Colored paper
- Images of Earth and selected planets

- You have to determine the length of the rope proportional to the distance of 3 different planets.
- The design of the vehicle is yours, you can use the suggested materials and more.
- You should show the route / speed information of the vehicles with a graph.
- When creating the idea design, you should specify in detail the materials you will use and the technical and numerical information you will include.

5. PHASE TRIAL: (10 min.)

The prototype is tested and its operation and functioning are checked. Corrections if is made necessary

You are carrying out a project. When this project is implemented, 3 different vehicles will come out of the world
They will go to the planets and return to earth with the samples they have taken. You should accurately represent this process and the technical information in the process in your design, discuss it with your teammates and intervene in the areas of the prototype that need improvement.

6. STAGE PROTOTYPE PRESENTATION: (20 min.)

All groups present their products and are observed to see if they have done the given task.

	Very good 3 Points	**Successful 2 Points**	**Improvement Required 1 point**
Presentation Capability	They can elaborate on the product, use body language well and communicate with the audience. ( )	Excited during the presentation but has sufficient knowledge about his/her subject and can complete the presentation on time. ( )	Excited and does not know / cannot express important information about the project. Also uses too little/too much time. Does not interact in any way. ( )

Intergroup Communication	The group is a preliminary study of the interaction and working environment in everyday life. There should be identification of tasks in the group, fulfillment/questioning of tasks in the process and joint decision-making. ( )	The group came together to do a specific task and completed the task and responsibility together. There is poor communication or cooperation between them. ( )	The group did not define tasks among themselves and did not react to tasks that were not done. There may be conflicts in this process, but if these conflicts are not resolved, the group skill is negatively affected. is evaluated. ( )

Time Management	Time management was applied correctly from the beginning to the end of the process, individually or as a group, in all assessments, and completion and delivery dates have been respected. ( )	Attention was paid to the time management process, but disruptions and delays occurred due to different reasons. ( )	Dates were not set, were not respected or the mission never materialized. ( )
Solar System	The learning outcomes related to the solar system were completely fulfilled. ( )	Partially fulfilled the learning outcomes related to the solar system. ( )	Acquisitions related to the solar system are not at a sufficient level. ( )
Constant Speed Movement	Acquisitions related to constant speed movement were completely fulfilled. ( )	Partially fulfilled the objectives related to constant speed movement. ( )	Acquisitions related to constant speed movement are not at a sufficient level. ( )
Data Processing	Acquisitions related to data processing have been fully met. ( )	Partially fulfilled the learning outcomes related to data processing. ( )	Acquisitions related to data processing are not at a sufficient level. ( )
...			
Total			

7. STAGE EVALUATION: (10 min.)

All groups evaluate and score the products of the other groups according to the evaluation rubric.

Members of the Evaluating Group	Presentation order and stages studied in advance. During the presentation, the audience and Interaction they can build.	The group works well together and has good communication There is.	The content of the product they offer meets the objectives and requirements.	Product. the effort and work done in the process of designing topics, study shape is successful.

8. STAGE DEVELOPMENT: (10 min.)

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

Suggestions for Teachers

The details of the physical design can

be increased. Planets can be limited.

Current technologies, spacecraft, missions of spacecraft, NASA and other research centers and Turkish scientists working in these centers should be mentioned.

Aerodynamics and mathematics should also be emphasized. In higher grades fields such as physics and materials science can be included.

SOURCE:

- https://www.bbc.com/turkce/haberler-dunya-54625987
- https://tr.wikipedia.org/wiki/Model_roket
- https://bilimgenc.tubitak.gov.tr/makale/uzaydaki-uydularin-sicakligi-kac-degrees-celsius
- https://tr.wikipedia.org/wiki/G%C3%BCne%C5%9F_Sistemi
- https://tr.wikipedia.org/wiki/Gezegen
- https://www.wikiwand.com/tr/Vostok_(space_arac%C4%B1)#/Tasar%C4%B1m_s%C3%BCreci
- https://www.dunyaatlasi.com/uzay-calismalarinda-kullanilan-araclar/
- https://www.parents.com/fun/arts-crafts/kid/craft-rocket/?socsrc=pmmpin130924cRocketCraft
- https://www.jpl.nasa.gov/edu/teach/activity/stomp-rockets/
- https://www.jpl.nasa.gov/edu/learn/project/make-a-straw-rocket/
- https://news.lenovo.com/stem-at-home-water-powered-rocket/
- https://www.wikihow.com.tr/%C5%9Ei%C5%9Feden-Nas%C4%B1l-Roket-Yap%C4%B1l%C4%B1r

Let's Speak English

Course Title:	Information Technologies and Software	Subject:	Programming

Gains in Information Technologies and Software:

BT.6.5.2.1. Recognizes the interface and features of the block-based programming tool.

BT.6.5.2.2. Describes the functions of a program presented in a block-based programming tool.

BT.6.5.2.3. Debugs a program presented in a block-based programming tool.

BT.6.5.2.4. Developing a program presented in the block-based programming tool according to the given criteria

BT.6.5.2.14. produces solutions to complex problems using different programming structures.

English Outcomes:

E7.10.L1. Learners will be able to explain the topic of discussion about popular science in simple oral
will be able to identify texts.

E7.10.SI1. Students will be able to make simple comparisons.

E7.10.SI2. Students will be able to talk about past events.

E7.10.SP1. Students will be able to report general truths in different ways.

E7.10.R1. Students will be able to identify facts and general truths in a variety of texts. will be able to identify specific information.

E7.10.R2. Students will be able to identify specific information about past events.

Mathematics Outcomes:

M.7.4.1.1. Creates and interprets line graphs related to the data.

M.7.4.1.2. Finds the mean, median and peak value for a data group and Comments.

M.7.4.1.3. Constructs and interprets a circle graph for a data group.

M.7.4.1.4. Shows data in column, circle or line graphs and makes appropriate transformations between these representations.

1. STAGE: SCENARIO: (5 min.)

Foreign language is the general name given to the languages taught in primary, high school and university in Turkey.

English, which has been taught as a foreign language in Turkey for many years, maintains this status. English teaching in Turkey started to lose the influence of French.

period, it made a breakthrough. French, once the language of the nobility, lost its
With the increasing American influence after World War II, English has gained importance in Turkey and around the world.

After the 8-year primary education law, English was withdrawn to the 2nd grade of primary school. With the extension of general high schools to 4 years, the concept of preparatory class has disappeared and the weekly hours of English classes have increased.

Many universities test their students' English proficiency even if they have taken a preparatory class in high school. Students who do not meet the prerequisites are brought to a sufficient level with intensive English programs in the preparatory class for one year. This proficiency system is also applied in English language teaching programs. English language teaching programs consist of 5 years and 10 semesters when the preparatory class is included. Students who pass the qualifying exam take courses in English reading and speaking skills, English grammar, writing skills and teaching methods as well as non-intensive courses in English literature, American literature and the history and structure of the English language. In addition, with the increasing importance of English today, many language training websites have been established. At the same time, there are various projects of the Ministry of National Education of the Republic of Turkey on computerized teaching of English.

2. PHASE PROBLEM: (10 min)

Foreign language education, especially English education, is provided in our country. But how well can we speak English with this education we receive? You can imagine this situation.

What do you think is our level of English speaking in Europe and the world? Let's try to guess which countries we speak English better than others?

The EF English Proficiency Index (EF EPI) is a list of countries ranked according to their average level of English language skills. It is the product of EF Education First, an international education company, and derives its results from data collected through English tests available free of charge online. Based on test data from 1.7 million participants, the online surveys were first published in 2011 and include data from Turkey.

https://www.ef.com.tr/epi/regions/europe/turkey/

In the picture, we see the levels of the 100 countries in the ranking in color. Although there are different reasons, excuses and interpretations for this situation, the common opinion is that there is not enough practice.

Artificial Intelligence technology has come to the forefront in these and many similar fields. This field, which is of interest to software and computer engineers, can also attract the interest of many different professions due to its multidisciplinary structure. You are a linguist and you are working on artificial intelligence. I want you to develop a product that we can practice English using artificial intelligence. You should choose one of the programs Block, PictoBlox or Scratch.

The people who will use your program should be able to chat for at least 5 minutes. The program should understand what we read by displaying text on the screen and determine our success. It should listen and check the answer we give by waiting for an answer in a question or situation.

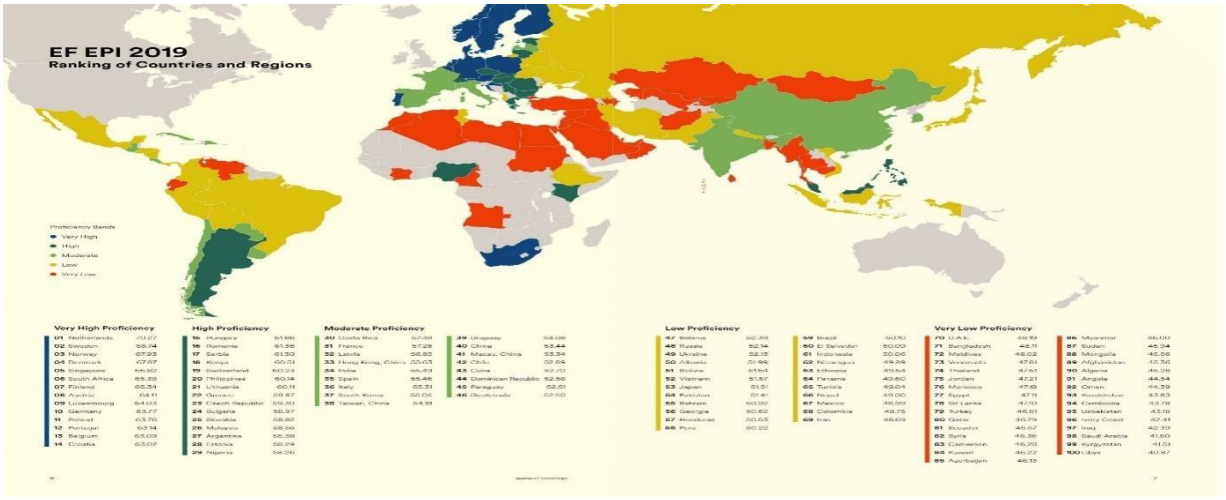
period, it made a breakthrough. French, once the language of the nobility, lost its

You can find detailed information about the programs by examining the resources below.

https://www.mblock.cc/doc/en/use-extensions/AI.html

https://thestempedia.com/blog/pictoblox-ai-artificial-intelligence-machine-learning-for-kids/

https://en.scratch-wiki.info/wiki/Artificial_Intelligence



This image was accessed from https://www.ef.com/ on 8.11.2020.

3. STAGE IDEA GENERATION: (20 min.)

Ideas are generated about the problem situation. All ideas are noted down. Idea by voting Determined.

4. STAGE PROTOTYPE CREATION: (120 min.)

The design is concretized through the idea produced. (Drawing)

Draw the visual interface and algorithm of the program. Code the program.

Program coding process computer, Internet, microphone and if you like you will need a camera (laptops have them).

The program must comply with the basic design principles and the criteria specified in the problem title.

Application uses are recorded in Google spreadsheets in the table structure to be planned. Simultaneously, it is shown with graphs.

5. PHASE TRIAL: (10 min.)

The prototype is tested and its operation and functioning are checked. Corrections if necessary

It is done.

STAGE 6 PROTOTOTYPE

All groups present their products and are observed to see if they have done the given task.

	Very good 3 Points	Successful 2 Points	Improvement Required 1 Point
Presentation Skills	They can elaborate on the product, use body language well and communicate with the audience. ( )	Excited during the presentation but has sufficient knowledge about his/her subject and can complete the presentation on time. ( )	Excited and does not know / cannot express important information about the project. Also uses too little/too much time. Does not interact in any way. ( )
Intergroup Communication	The group is a preliminary study of the interaction and working environment in everyday life. There should be identification of tasks in the group, fulfillment/questioning of tasks in the process and joint decision-making. ( )	The group came together to do a specific task and completed the task and responsibility together. Communication between them or the state of cooperation is weak. ( )	The group did not define tasks among themselves and did not react to tasks that were not done. There may be conflicts in this process, but if these conflicts are not resolved, the group skill is negative. is considered as. ( )
Time Management	Time management was applied correctly from the beginning to the end of the process, individually or as a group, in all assessments, and completion and delivery dates have been respected. ( )	Attention was paid to the time management process, but disruptions and delays occurred due to different reasons. ( )	Dates were not set, were not respected or the mission never materialized. ( )
Programming	Acquisitions related to programming have been completely fulfilled. ( )	Partially fulfilled the learning outcomes related to programming. ( )	Acquisitions related to programming are not at a sufficient level. ( )
Planets	The learning outcomes related to listening, speaking and reading about the planets are completely fulfilled. has been brought. ( )	Partially fulfilling the learning outcomes related to listening, speaking and reading about the planets He brought it. ( )	Sufficient gains related to listening, speaking and reading about the planets is not at the same level. ( )
Data Processing	Acquisitions related to data processing have been fully met. ( )	Partially fulfilled the objectives related to data processing. ( )	Acquisitions related to data processing are not at a sufficient level. ( )
...			
Total			

STAGE 7 EVALUATION: (10 min.)

The Whole groups other groups products evaluation rubric evaluates and scores them accordingly.

Members of the Evaluating Group	Presentation order and stages studied in advance. During the presentation, the audience and Interaction they can build.	The group works well together and has good communication There is.	The content of the product they offer meets the objectives and requirements.	Product the effort and work done in the process of designing the subjects, the way of working is successful.

8. STAGE DEVELOPMENT: (10 min.)

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

SOURCE:

- https://tr.wikipedia.org/wiki/T%C3%BCrkiye%27de_yabanc%C4%B1_dil_%C3%B6%C4%9Fretimi
- https://www.ef.com.tr/epi/regions/europe/turkey/
- https://www.mblock.cc/doc/en/use-extensions/AI.html
- https://thestempedia.com/blog/pictoblox-ai-artificial-intelligence-machine-learning-for-kids/
- https://en.scratch-wiki.info/wiki/Artificial_Intelligence
- http://aok.meb.gov.tr/kitap/aol-kitap/Ingilizce/ingilizce-7/ingilizce_7.pdf
- http://www.teamelt.com/iteam/setup_iTEAM_MEB_7.exe
- https://www.eba.gov.tr/arama?q=%C4%B0ngilizce%207%20Ders%20Kitab%C4%B1

Haydí Kalk Gídelím

Course Title:	Social Studies	Subject:	People, Places and Environments

Social Studies Outcomes:

SB.5.3.1. Explains the landforms of the place where he/she lives and its surroundings on maps in general.

SB.5.3.2. Explains the effects of climate on human activities in his/her environment by giving examples from his/her daily life.

Gains in Information Technologies and Software:

BT.5.3.2.1. Explains the formation and structure of internet addresses.

BT.5.3.2.2. Explains the concept of web browser and uses the browser.

BT.5.3.2.3. Conducts simple research using search engines. BT.5.3.2.4. Questions

the accuracy of the information from different sources.

BT.5.3.2.5. Organizes the information he/she reaches by showing the source.

Mathematics Outcomes:

M.5.3.1.1. Formulate research questions that require data collection.

M.5.3.1.2. Collects data related to research questions and shows them in frequency tables and column graphs.

M.5.3.1.3. Solves problems related to the interpretation of data represented by a frequency table or column graph.

1. STAGE SCENARIO: (10 min.)

"The freshness and flavor of vegetables and fruits grown in season are different! Fruits and vegetables that grow on time and come to our tables are our source of both minerals and vitamins. For this reason, it is very important for us to consume seasonal products.

In every season, we have different nutritional needs according to the changing weather and other conditions. For this reason, we can say that in order to adapt our body to the changing season in the best way, we should eat vegetables and fruits that are "in season". So let's start exploring the vegetables and fruits we can consume in winter for a balanced diet!"

What are Winter Fruits and Vegetables and How Should They Be Consumed?

- İşbank Blog What were the vegetable dishes we ate in the last 1 week?

Where and in which seasons do these vegetables grow naturally?

What fruit trees have you seen before?

Is watermelon a vegetable or a fruit? How can you tell whether a food is a How do we know if it's true?

2. PHASE PROBLEM: (10 min.)

Fruits and vegetables that we eat to benefit us and protect our health can sometimes be harmful. One of the rules of healthy nutrition is to eat naturally, that is, to eat what we see outside the window in nature, in our neighborhood, in our village, whatever grows in that period.

If we think of the world as a big house, we say Gaziantep should be its kitchen. However, there are foods and growing areas that do not grow in Gaziantep or that, although they grow in Gaziantep, allow them to grow better due to the conditions of another place.

A foodie living in Gaziantep is planning a 1-year trip. You have to help her plan her trip.

You should help him/her by preparing a table/graph with the following questions.

Which cities should he visit? (Visiting during the harvest period for whatever he has to eat have to)

What is the temperature, precipitation and other climatic information and altitude level of the cities he/she visited that month?

In each city, what should be the menu for the 2 local dinners in that region?

How many kilometers will he/she have traveled on the journey starting from Gaziantep and returning to Gaziantep?

3. STAGE IDEA GENERATION: (20 min.)

(Ideas are generated about the problem situation. All ideas are noted. Idea by voting is determined.)

Recommendations: Research the season and harvest time of the food and create a general itinerary based on the cities where it is grown.

Information about the climate of cities

You can reach them at https://www.mgm.gov.tr/tahmin/il-ve-ilceler.aspx#/.

You can use local blogs for local dishes in cities, distance
You can use the digital map application for calculations.

STAGE 4 PROTOTOTYPE CREATION: (40

The design is concretized through the idea produced.

How would you like to become an Accommodation and Travel Specialist? A person who receives vocational training in this field has all kinds of knowledge about accommodation for people who travel for professional, cultural and educational purposes or for people who make different trips.

I want you to prepare a detailed travel plan that includes the ideas you generated in the previous stage.

You should submit your plan in a hard copy file with a cover sheet.

The more detailed this plan is, the better. Here are some of the details you shouldn't skip:

Cities:

Physical-Natural Features

Cultural Features

Route:

Places to take a break

Time management

Suggestions:

Food Shopping

Sights

5. PHASE TRIAL: (20 min.)

The prototype is tested and its operation and functioning are checked. Corrections if necessary
It is done.

Share this itinerary of different cities with your family members
your thoughts and suggestions.

6. STAGE PROTOTYPE PRESENTATION: (20 min.)

All groups present their products and are observed to see if they have done the given task.

	Very good 3 Points	**Successful 2 Points**	**Improvement Required 1 point**
Presentation Skills	They can elaborate on the product, use body language well and communicate with the audience. ( )	Excited during the presentation but has sufficient knowledge about his/her subject and can complete the presentation on time. ( )	Excited and does not know / cannot express important information about the project. Also uses too little/too much time. In no way does not interact. ( )

	Very good 3 Points	Successful 2 Points	Requires Improvement 1 Point
Intergroup Communication	The group is a preliminary study of the interaction and working environment in everyday life. There should be identification of tasks in the group, fulfillment/questioning of tasks in the process and joint decision-making. ( )	The group came together to do a specific task and completed the task and responsibility together. There is poor communication or cooperation between them. ( )	The group did not define tasks among themselves and did not react to tasks that were not done. There may be conflicts in this process, but if these conflicts are not resolved, the group skill is negatively affected. is evaluated. ( )
Time Management	Time management was applied correctly from the beginning to the end of the process, individually or as a group, in all assessments, and completion and delivery dates have been respected. ( )	Attention was paid to the time management process, but disruptions and delays occurred due to different reasons. ( )	Dates were not set, were not respected or the mission never materialized. ( )
Research	The outcomes related to the research were completely fulfilled. ( )	Partially fulfilled the learning outcomes related to research. ( )	Acquisitions related to research are not at a sufficient level. ( )
Data Processing	Acquisitions related to data processing have been fully met. ( )	Partially fulfilled the learning outcomes related to data processing. ( )	Acquisitions related to data processing are not at a sufficient level. ( )
Visual Processing Programs	The acquisitions related to Visual Processing Programs are completely replaced by has been brought. ( )	Partially fulfilled the objectives related to Visual Processing Programs. ( )	Their achievements related to Visual Processing Programs are not at a sufficient level. ( )
...			
Total			

7. STAGE EVALUATION: (10 min.)

The Whole groups other groups products evaluation rubric evaluates and scores them accordingly.

Members of the Evaluating Group	Presentation order and stages studied in advance. During the presentation, the audience and Interaction they can build.	The group works well together and has good communication There is.	The content of the product they offer meets the objectives and requirements.	Product the effort and work done in the process of designing the subjects, the way of working is successful.

STAGE 8 DEVELOPMENT: (10

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

Suggestions for Teachers

This lesson plan is designed to enable students to develop map and digital research skills and to solve problems individually or in a working group.

The lesson plan can be developed according to the geography and the topics to be taught by keeping the map and route fixed and changing other variables.

The implementation and measurement phases can be enriched with online assessment and web 2.0 tools.

New routes from abroad can be added.

SOURCE:

- https://www.google.com.tr/maps/
- https://www.google.com/travel/hotels/
- https://paintmaps.com/tr/bos-haritalar/217/Turkiye-haritasi-bos-dilsiz
- https://www.kulturportali.gov.tr/
- https://tr.wikipedia.org/wiki/T%C3%BCrkiye%27de_yeti%C5%9Ftirilen_tar%C4%B1m_%C3%BCr%C3%BCnleri
- https://www.google.com/travel/things-to-do
- https://www.mgm.gov.tr/tahmin/il-ve-ilceler.aspx#
- https://todoist.com/tr

Pressurized Box

Course Title:	Science	Subject:	Liquid Pressure

Science Outcomes:

F.8.3.1.2. Predict the variables affecting fluid pressure and test their predictions.

a. It is stated that gases exert pressure in a similar way to liquids.

F.8.3.1.3. Gives examples of applications of pressure properties of solids, liquids and gases in daily life and technology.

a. Examples of applications of Pascal's Principle related to liquid pressure are given.

Mathematics Outcomes:

M.5.2.4.1. Calculates the area of a rectangle, using square centimeters and square meters.

a) The square is treated as a special case of the rectangle.

b) In addition, studies are included to make sense of the concept of field.

M.5.2.4.2. Estimate a specified area in units of square centimeters and square meters It does.

Activities for checking predictions by making measurements are included.

M.5.2.4.3. Create different rectangles with a given area.

a) The side lengths are restricted to be natural numbers.

M.6.3.5.1. Recognizes and converts liquid measurement units.

a) Conversions related to liquid measurement units are made only between L, cl and ml.

M.7.1.4.3. Decides whether two multiplicities are proportional by examining real-life situations.

a) It is emphasized that the equality of two ratios is called a proportion.

b) Direct proportional multiplicities are handled.

M.7.3.2.3. Recognizes rectangle, parallelogram, trapezoid and rhombus; determines angle properties.

a) Along with the angles formed by the sides, the angles formed by the diagonals in rhombus, square and rectangle are also examined.

b) The square is treated as a special case of the rectangle and rhombus. In addition, rectangle and rhombus are considered as special cases of parallelogram. Rectangle, rhombus and parallelogram are also considered as special cases of trapezoid.

M.8.4.1.1. Interprets line and bar graphs of up to three groups of data.

Engineering Gains:

1. The student researches the branches of engineering and compares their fields of study. Recognizes current and interdisciplinary engineering branches.

2. The learner lists the steps of the design process and explains the activities in each part.

3. The student takes care of the materials and the environment during the work. Uses hazardous materials safely.

4. Students will be able to express their ideas and findings clearly and coherently to the target audience using visual, written and oral communication methods.

5. The student applies mathematical formulas or arrives at mathematical formulas from the data obtained.

Technology Gains:

1. Defines the problem by analyzing the results obtained from research.

2. Think solution-oriented when faced with problems.

3. Uses instructions, establishes cause-effect relationships and gains the ability to develop the plot.

Gains in Information Technologies:

5.5.1.1.Suggests solutions to problems encountered in daily life. Social

Product Outcomes

1. Recognizes the importance of working in cooperation with friends.

2. The student presents the designed product in a clear and understandable way.

Recommended Ingredients:

- Wooden sticks (can be in desired sizes and desired numbers)
- Ruler
- Adhesive (silicone gun etc.),
- Colorful paints and ornaments,
- Syringe and serum apparatus (available from pharmacies)
- Some liquid (can be colored).

STAGE 1 SCENARIO: (10

What do you see in this image? This structure, which we are used to seeing almost everywhere in our schools, shopping malls, restaurants, hospitals, has taken a place in our lives due to the coronavirus (Covid-19) outbreak. How do you think the working principle of this structure that transfers disinfectant when the pedal is pressed? Which professions may have worked in the production of hand sanitizer apparatus?

Pascal's Principle exploits the ability of liquids to transmit pressure. Liquids transmit pressure equally in all directions. Based on this principle, many tools that we use in daily life have been designed. For example, fire brigade ladders, barber chairs, brake systems in vehicles are some of the areas where this principle is used in daily life.

Are there other structures with the same working principle as the hand sanitizer apparatus? With the given materials, we will make a sample design in which liquid pressure is used in daily life.

2. PHASE PROBLEM: (15 min.)

How can liquid pressure be used to create other items used in everyday life? Can a box be made that can be opened with the help of liquid pressure?

3. STAGE IDEA GENERATION: (15 min.)

(Ideas are generated about the problem situation. All ideas are noted. Idea by voting is determined.)

4. STAGE PROTOTYPE CREATION:(20 min.)

The design is concretized through the idea produced. (Drawing)

5. PHASE TRIAL: (10 min.)

The prototype is tested and its operation and functioning are checked. Corrections if necessary
It is done.

6. STAGE PROTOTYPE PRESENTATION:(20 min.)

All groups present their products and are observed to see if they have done the given task.

STAGE 7 EVALUATION: (15 min.)

Rubric - 1

SKILLS	VERY GOOD (3p.)	SUCCESSFUL (2 p.)	DEVELOPMENT NEEDED (1 p.)
Presentation Skills	Product can elaborate, use body language well during the narration and communicate with the audience. contacting them.	Excited during the presentation but own topic enough about knowledge, able to complete the presentation on time.	She is excited and does not know / cannot articulate important information about the project. Also too much time less/more too much. He doesn't interact in any way.
Intergroup Communication	Group daily interaction in life and working environment one is preliminary work. Tasks in the group determination, fulfillment/questioning of tasks in the process and joint decision-making retrieval must exist.	Group specific came together to carry out a task and completed the task and responsibility together. Communication between them or the state of cooperation is weak.	Task definition among the group itself not done, tasks not done against did not react. There may be conflicts in this process, but if these conflicts are not resolved, the group skill is negative. is considered as.
Time Management	Time management from the beginning to the end of the process, individually or as a group, in all evaluations imple mented correctly and deadlines and deadlines were met.	Time manage ment process attent ion has been paid, but the resulting disru ptions and delays due to different reasons formed.	Dates were not set, were not respected or the mission never materialized.
Additional Gain			
Additional Gain			
TOTAL			

Rubric - 2: Intergroup Evaluation Example

Members of the Evaluating Group	Presentation order and stages studied in advance. During the presentation, the audience and Interaction they can build.	The group together a good and successful work they have communication.	The content of the product they offer meets the objectives and requirements.	Product the efforts made in the process of designing and the subjects studied, the way of working successful.

STAGE 7 EVALUATION: (15 min.)

NOTE TO TEACHER

The class is divided into groups. The groups bring enough materials and make a meeting and planning for their work. Math acquisitions are taken into account to create boxes of different sizes and areas. Students design a box that works with liquid pressure in any shape and size they want.

(see: https://www.youtube.com/watch?v=twSk8BreSqs)

STAGE 8 DEVELOPMENT: (15 min.)

In the presentation and evaluation parts of their work, students improve the parts that they think are missing or need to be corrected.

SOURCE:

- Grade 8 Science Textbook
- https://www.youtube.com/watch?v=twSk8BreSqs
- http://mufredat.meb.gov.tr/Dosyalar/201812312311937-FEN%20B%C4%B0L%C4%B0MLER%C4%B0%20%C3%96%C4%9ERET%C4%B0M%20PROGRAMI2018.pdf
- http://mufredat.meb.gov.tr/Dosyalar/201813017165445-MATEMAT%C4%B0K%20%C3%96%C4%9ERET%C4%B0M%20PROGRAMI%202018v.pdf
- http://mufredat.meb.gov.tr/Dosyalar/2018124103559587-Bili%C5%9Fim%20Teknolojileri%20ve%20Yaz%C4%B1l%C4%B1m%205-6.%20S%C4%B1n%C4%B1flar.pdf

Choose your side Venus or Mars?

Course Title:	Science	Subject:	Spacecraft Design

Science Outcomes

F.7.1.1.1. Explains space technologies.

F.5.2.1.1. Classifies living things according to their similarities and differences by giving examples.

a. Archaea bacteria are described. How they adapt to extreme living conditions.

b. The elements necessary for a place to be alive are investigated.

F.6.1.1.1. Compares the planets in the solar system with each other.

a. The planets Venus and Mars are specifically mentioned with research data.

F.6.4.3.3. Develops alternative thermal insulation materials.

Technology and Design Lesson Outcomes

TT. 7. D. 1. 4. Creates a model or prototype of the design.

TT. 7. D. 1. 5. Evaluates the design according to the specified criteria.

TT. 7. D. 1. 6. product According to evaluation restructures. Conclusions

TT. 7. D. 2. 1. Presents the product or products to be exhibited.

Engineering Gains:

MTB1 - Defining the design problem needed in daily life and determining the qualities and possible obstacles that the design must have in order to be successful.

MTB2 - The student determines the stages required to produce the product to be designed and
presents the product in an appropriate way.

1. STAGE: SCENARIO: (10 min.)

The image on the left is of the Space X spacecraft. Accessed from https://bilimgenc.tubitak.gov.tr/ on 27/01/2021.

The image on the right is of the Discovery spacecraft. Accessed from https://tr.wikipedia.org/ on 27/01/2021.

What are the first images that come to mind when you think of space? Colorful dots interspersed in perfect balance on a dark navy blue, black field? Light energy that can move at speeds beyond our imagination? Our universe that is expanding more and more every second? The Big Bang Theory? Astronauts dressed in white practicing spacewalks in zero gravity? Satellites placed just beyond our atmosphere? Or is it the Sun and the Moon, the celestial bodies we see the most?

Throughout history, people have been interested in the universe, the planets, and whether there is other life. They have invented astrolabe-like instruments and made very close to realistic calculations of planetary movements with these instruments. They tried to measure time by looking at celestial bodies. For this purpose, they made observations throughout the day and night and made calculations in the light of these observations.

States have established special institutions and allocated budgets for space exploration. They have developed telescopes like the Hubble Space Telescope to observe even more distant galaxies. They were able to view and photograph celestial bodies tens of light years away.

https://hubblesite.org/ website visuals are examined together with the students.

They have developed manned or unmanned spacecraft and sent them into space. As a result of their research and experiences, they have tended to go first to the Moon and then to the planets Mars and Venus. In fact, this curiosity has reached such a level that some questions have begun to come to mind:

Can we create a new habitat on another planet? Can we

migrate to other celestial bodies?

2. PHASE PROBLEM: (15 min.)

Our questions about the universe never seem to end. Without going too far, why don't we take a look at a scientific debate that has affected us more recently? Due to problems such as population growth, lack of water, global warming, changes in ecosystems, etc., scientists have started to take a closer look at the planets

around us. Who are these planets? Venus and Mars, of course. Let's not think of them as being very close to us.

https://www.ntv.com.tr/turkiye/marsa-80-bin-nufuslu-colony,_5yY8F5wp0Shr2UBhHRhEghaberi is examined with the students. The information they have previously learned about the subject is questioned.

https://solarsystem.nasa.gov/solar-system/our-solar-system/overview/ website is examined together in the classroom and the distances between the planets and the differences and similarities of the characteristics of the planets are discussed. Discussion method is used about the subject. Students express their thoughts and make comments. During the discussion, guidance is given with questions similar to the ones below.

What kind of spacecraft can be used for space

travel? What are the characteristics of the vehicles

used to go to Mars? What kind of vehicle should we

have to go to Venus?

Is the vehicle used to go to Mars also suitable for the planet Venus? After

the discussion, the activity begins. Our activity consists of two parts:

First Section Venus or Mars from their planet appropriate to choose someone you think is

Part Two Designing an economical and aerodynamic spacecraft suitable for the conditions of the selected planet

3. STAGE IDEA GENERATION: (60 min.)

In this section, ideas about the problem situation are generated. All ideas are noted down. The idea is decided by a vote.

Preliminary Preparation: Before the activity, students are divided into groups of 5-7 students. The groups can sit in a circle, semi-circle, etc. close to each other.

Lesson Flow: The groups are informed that the activity will consist of two parts. The first part is about choosing one of the planets Venus or Mars and the second part is about designing a simple, economical and aerodynamic spacecraft suitable for the conditions of the selected planet.

The jigsaw technique will be applied for both parts of the activity. If students have not experienced it before, the Jigsaw Technique is introduced. The groups distribute the tasks equally among the members.

What each group should do for the first part of the activity:

Conducting research on the planet Venus in terms of size, atmospheric properties, climate, soil structure, geographical shapes, suitability for plants and animals, presence of water, etc.

Conducting research on the size, atmospheric properties, climates, soil structure, geographical shapes, suitability for plants and animals, presence of water, etc. about the planet Mars

The following news items can be used during investigations:

https://www.esa.int/Science_Exploration/Space_Science/Mars_Express/Mars_

and_Venus_are_surprisingly_similar#:~:text=Venus%20atmosphere%20is%20thick%20and,Mars%20is%20light%20and%20tenuous.&text=Another%20illuminating%20difference%20between%20Mars,the%20crust%20of%20the%20planet.

https://www.forbes.com/sites/startswithabang/2019/03/27/what-was-it-like- when-venus-and-mars-became-uninhabitable-planets/?sh=2d3e4a717b91

https://www.jpl.nasa.gov/edu/learn/video/solar-system-size-and-distance/

https://tr.wikipedia.org/wiki/Kategori:Uzay_ekonomisi

https://tr.wikipedia.org/wiki/Mars%27%C4%B1_D%C3%BCnyala%C5%9Ft%C4%B1rma

https://tr.wikipedia.org/wiki/Gezegensel_ya%C5%9Fan%C4%B1labilirlik

The groups meet and discuss the results of the research among themselves. Each The member summarizes what they have researched and what they have learned through the Jigsaw Technique. Each group brainstorms whether Venus or Mars is more suitable. A decision is taken after a democratic vote.

What each group should do for the second part of the activity:

In order to determine the characteristics of the tool to be designed, group members identify research topics. The following topics, etc. can be suggested by the teacher as research topics:

Examples of aerodynamic design,

Compatibility with the atmospheric conditions of the

selected planet, Insulation materials of spacecraft

Group members share the research topics equally.

Each member learns their own research topic. Thanks to Jigsaw, they increase their knowledge and return to their group.

They share what they have learned from their research and discuss what kind of design they will draw. In the meantime, they can make preliminary drawings and doodles.

4. STAGE PROTOTYPE CREATION: (80 min.)

In this section, the design is concretized through the idea produced.

Preliminary Preparation: Since the students are moving on to the application part, they can prepare materials suitable for the designs they have planned (Example: computer, colored pencils, colored papers...)

Course Flow:

What each group should do for the first part of the activity:

Summarize the research on the planet Venus

Summarizing the researches about the planet Mars

Making infographics of the summaries created for the planets Venus and Mars (Websites such as Canva, Piktochart, Creately, etc. can be used.) For

the second part of the activity, each group needs to do the following

The tasks to be performed during the design process are identified and

distributed equally among the members.

The drawing of the design is completed. (It can be drawn on the computer or on paper and pencil).

Aerodynamics, the suitability of the materials used for the selected planet, and the economic value of the materials used should be shown in detail in the design.

Profession, Duties and Responsibilities: At the end of the first chapter, the teacher introduces the profession called 'planetary engineering'. During this process, videos, visuals and news can be used. Sample videos:

https://www.natgeotv.com/tr/gezegen-muhendisleri/hakkinda

5. PHASE TRIAL: (10 min.)

Groups prepare their infographics and presentation flow of their spacecraft designs before presenting to the whole class. They distribute tasks. They make corrections if necessary. They complete their final checks.

6. STAGE PROTOTYPE PRESENTATION: (20 min.)

All groups pay attention to the following steps while making their presentations: They share what they have learned from the research through the infographics they have prepared. They explain in detail the reasons for choosing the planet of their choice.

They share the design of the spacecraft they have prepared.

They include details about the materials used in spacecraft design, suitability for the planet, aerodynamics.

7. STAGE: EVALUATION: (10 min.)

There are two types of evaluation. These evaluations are as follows:

All groups evaluate and score members of other groups according to the peer evaluation scale.

The teacher evaluates and scores the presentations of all groups according to the product evaluation scale.

Peer Assessment Scale					
Criteria	**5**	**4**	**3**	**2**	**1**
He used his voice and body language effectively.					
He spoke in an audible voice.					
He pronounced the words correctly.					
He emphasized, paused and intoned.					
He made eye contact with the audience.					

He spoke fluently and clearly.					

Peer Assessment Scale					
Criteria	**5**	**4**	**3**	**2**	**1**
He spoke with gestures and facial expressions.					
He spoke without doing it again.					
His speech was proper etiquette.					
He completed his speech within the specified time.					
Used newly learned words appropriately and appropriately.					
They conveyed their feelings and thoughts effectively.					
Score					
TOTAL SCORE					

Teacher Scale / Product Evaluation Scale			
	Very good 3 Points	**Successful 2 Points**	**Improvement Required 1 point**
Presentation Skills	They can elaborate on the product, use body language well and communicate with the audience. ( )	Excited during the presentation but has sufficient knowledge about his/her subject and can complete the presentation on time. ( )	Excited and does not know / cannot express important information about the project. Also uses too little/too much time. Does not interact in any way. ( )
Intergroup Communication	The group is a preliminary study of the interaction and working environment in everyday life. There should be identification of tasks in the group, fulfillment/questioning of tasks in the process and joint decision-making. ( )	The group came together to do a specific task and completed the task and responsibility together. There is poor communication or cooperation between them. ( )	The group did not define tasks among themselves and did not react to tasks that were not done. There may be conflicts in this process, but if these conflicts are not resolved, the group skill is evaluated negatively. ( )
Time Management	Time management was applied correctly from the beginning to the end of the process in all individual and group assessments, and deadlines and deadlines were met. ( )	Attention was paid to the time management process, but disruptions and delays occurred due to different reasons. ( )	Dates were not set, were not respected or the mission never materialized. ( )
Infographic Design	The design is original, prepared using different tools, appealing to the eye, made	The design is original, prepared using different tools, appealing to the eye, but it is made	The design is not original and does not fully capture the essence of the research.

Teacher Scale / Product Evaluation Scale			
	Very good 3 Points	**Successful 2 Points**	**Improvement Required 1 Point**
	is such that it contains the essence of the research.	does not fully capture the essence of the research.	
Suitability of materials to the selected planet	The properties of the selected materials are clearly mentioned, and an explanation of why and how they are suitable for the planet is given in detail.	The properties of the selected materials are clearly mentioned, but the explanation of why and how they are suitable for the planet is not detailed.	The properties of the selected materials are not clearly mentioned and no explanation is given as to why and how they are suitable for the planet.
Aerodynamics Design	The parts that indicate aerodynamic design are shown and explained in detail, and other similar examples are described.	Parts that indicate aerodynamic design are shown but not described in detail.	Parts indicating aerodynamic design are shown but not described.
Economic value of materials	The economic characteristics of the selected materials are clearly mentioned and explained in detail in terms of price and performance characteristics.	The economic properties of the selected materials were mentioned in a cursory manner and explained in terms of price and performance characteristics.	The economic properties of the selected materials were mentioned in a cursory manner, and their explanation in terms of price and performance characteristics was cursory.
Total			

8. STAGE DEVELOPMENT: (10 min.)

In the presentation and evaluation parts of the work, the groups develop the parts that they think are missing or need to be corrected. If they wish, they can share the final version with the class again.

SOURCE:

- Canva (2020). Retrieved from Canva: https://www.canva.com/tr_tr/.
- creately. (2020). creately: Retrieved from https://creately.com/.
- Demircan, K. (2020, July 20). SHOULD WE SETTLE ON THE PLANET VENUS INSTEAD OF MARS? Kozan Demircan: https://khosann.com/mars-yerine-venus-gezegenine-mi-yerleselim/ Retrieved from
- Fen Sciences Lesson Teaching Program. (2018). MEB: http://mufredat.meb.gov.tr/Dosyalar/201812312311937-FEN%20B%C4%B0L%C4%B0MLER%C4%B0%20%C3%96%C4%9ERET%C4%B0M%20PROGR Retrieved from AMI2018.pdf.
- PLANET ENGINEERS (date none). natgeotv Retrieved from https://www.natgeotv.com/tr/gezegen-muhendisleri/hakkinda
- Planetary habitability. (2020, December 4). Retrieved from wikipedia: https://tr.wikipedia.org/wiki/Gezegensel_ya%C5%9Fan%C4%B1labilirlik.

- Hubble Space Telescope. (2019, October 21). HubbleSite: https://hubblesite.org/ Retrieved from
- Mars and Venus are surprisingly similar. (2008, March 5). ESA: https://www.esa.int/Science_Exploration/Space_Science/Mars_Express/Mars_and_Venus_are_surprisingly_similar#:~:text=Venus's%20atmosphere%20is%20thick%20and,Mars%20is%20light%20and%20tenuous.&text=Another%20illuminating%20difference%20between%20Mars,the%20c retrieved from
- (2012, November 27). ntv: https://www.ntv.com.tr/turkiye/marsa- 80-bin-nufuslu-colony,_5yY8F5wp0Shr2UBhHRhEg
- Mars Worldization (2020, range 5). wikipedia: - Retrieved from https://tr.wikipedia.org/wiki/Mars%27%C4%B1_D%C3%BCnyala%C5%9Ft%C4%B1rma.
- NASA says goodbye to Mars rover Opportunity. (2019, February 14). universal: https://twitter.com/umutayildiz/status/1095763949113487360?ref_src=twsrc%5Etfw%7Ctwcamp%5Etweetembed%7Ctwterm%5E1095763949113487360%7Ctwgr%5Eshare_3&ref_url=https%3A%2F%2Fwww.evrensel.net%2Fhaber%2F373582%2Fnasa-mars-kesif-araci-opportunityye-veda-etti
- NASA's InSight spacecraft has landed on Mars! Here's the first frame. (2018, Nov. 27). milliyet: https://www.milliyet.com.tr/teknoloji/nasanin-insight-adli-uzay-araci-marsa-indi-iste-ilk-kare-2785118
- Nasa's Eye (no date). Nasa: https://eyes.nasa.gov/apps/orrery/#/home received
- piktochart. (2020). piktochart: Retrieved from https://piktochart.com/.
- Sarıgül, D. T. (2019, June 25). Astronomical Calculation Tool: Usturlap. Bilim Genç Tübitak: Retrieved from https://bilimgenc.tubitak.gov.tr/makale/astronomik-hesaplama-aleti-usturlap
- Sarıgül, D. T. (2020, February 20). SpaceX is Very Close to Transporting Astronauts to Space. Bilim Genç Tübitak: Retrieved from https://bilimgenc.tubitak.gov.tr/makale/spacex-astronotlari-uzaya- tasimaya-cok-yakin.
- Solar System Exploration. (2019, April 29). Nasa Science: Retrieved from https://solarsystem.nasa.gov/solar-system/our-solar-system/overview/
- Solar System Size and Distance. (no date). Nasa Jet Propulsion Labaratory: Retrieved from https://www.jpl.nasa.gov/edu/learn/video/solar-system-size-and-distance/
- Spacecraft. (2020, December 14). Retrieved from wikipedia: https://tr.wikipedia.org/wiki/Uzay_arac%C4%B1
- Space Economics. (2017, October 10). Retrieved from wikipedia: https://tr.wikipedia.org/wiki/Kategori:Uzay_ekonomisi
- Spacecraft Sent to Venus (2019, March 13). Space: Retrieved from https://www.uzay.co/venuse- gonderilen-uzay-araclari/
- What Was It Like When Venus And Mars Became Uninhabitable Planets? (2019, March 27). Forbes: - Retrieved from https://www.forbes.com/sites/startswithabang/2019/03/27/what-was-it- like-when-venus-and-mars-became-uninhabitable-planets/?sh=2d3e4a717b91

I Love the World, I Protect My Environment

Course Title:	Science	**Subject:**	Fossil fuel use of and impact of thermal insulation on environmental pollution.

Science Outcomes

F.6.4.3.2. Determines the selection criteria of thermal insulation materials used in buildings.
F.6.4.3.4. Discusses the importance of thermal insulation in buildings in terms of family and country economy and effective use of resources.
F.6.4.4.1. Classifies fuels as solid, liquid and gaseous fuels and gives examples of commonly used fuels.
F.5.6.2.2. Offers suggestions for solving an environmental problem in his/her immediate environment or in our country.
F.5.6.2.3. Makes inferences about environmental problems that may occur in the future as a result of human activities.

Mathematics Outcomes

M.6.4.1.1. Formulate research questions that require comparing two sets of data and obtains appropriate data.
M.6.4.1.2. Shows the data of two groups in a binary frequency table and a column chart.

Social Product Outcomes:

-Communicate effectively with residents and neighbors, share ideas and work for the solution of community problems.
-The student presents the designed product in a clear and understandable way to the neighborhood residents, family and classmates.

1. STAGE: SCENARIO: (10 min.)

The image on the left shows gas emissions from the burning of fossil fuels. Accessed from https://pxhere.com/tr/photo/1549165 on 28/01/2021.

On the right visual thirst tells the story. 28/01/2021 in the history of Retrieved from https://pxhere.com/tr/photo/613809.

Global warming is one of the most shocking and irreversible realities of our is one of them. The increasing world population and the increasing love of consumption cause continuous production. As the need for production areas such as factories, industries, etc. increases, the number of factories and industrial zones also increases. The use of fossil fuels (usually coal) to generate electricity and power to provide the energy needed is also increasing. But does increased use of fossil fuels only bring benefits to our beloved planet?

As the gases released from the use of fossil fuels increase in the atmosphere, the increase in temperature endangers our Earth. Temperature averages that rise above normal threaten all living things and all nature. Species face the danger of extinction. The frequency of natural disasters increases. Fresh water resources become insufficient. The quality and efficiency of agriculture, animal husbandry, etc. decreases.

But are fossil fuels only used in factories and industries? What are their areas of use in daily life? What do the gases released as a result of their use cause? Are there methods that can be applied to reduce the use of fossil fuels?

Environmental pollution, air pollution, fossil fuel use, global climate change, thirst, etc. Sample public service announcements on the topics are watched by the class. A sample link is given below:

https://egethm.csb.gov.tr/temiz-hava-kamu-spotu-duyuru-367390

It is stated that fossil fuels are limited and one of the non-renewable energy sources and the importance of renewable energy sources is emphasized by giving examples.

2. PHASE PROBLEM: (20 min.)

Miraç is a student at a middle school in Gaziantep. On a winter day when he leaves school, he notices the air pollution in the neighborhood. He remembers that a few days ago, he and his family visited a house with a stove on a trip to relatives. He starts to think that products such as coal etc. create smoke and air pollution in the neighborhood. At the same time, he remembers that although the stove is lit, the house is not very warm. He starts to remember the houses he has visited before that use stoves. He realizes that most of them have the same exterior appearance. When he asks his father why the houses are not warm, he learns that a material called 'briquette' was used during their construction and that this material does not keep the house warm enough. He then starts to wonder.

Which materials can keep homes warmer? Is there a way to

reduce air pollution in our neighborhood? Is there a means of

heating that does not pollute the air in our neighborhood?

News, documentaries, videos and photographs about global warming, fossil fuels and especially the use of coal, and issues related to global climate change are examined. Examples of these sources are as follows:

http://climatechange.boun.edu.tr/iklim-degisikligi-ve-yenilenebilir-energy/#:~:text=As%20we%20mentioned%20above%20in%C4%B1,%20fossil%20fossils%20like%20our%20fossils%20are%20also%20causing%20the%20climate%20decrease%20in%20C4%9Fi%C5%9Fikli%C4%9Fine%20cause%20c4%C4%B1r.&text=Bu%20olumsuz%20sonu%C3%A7lar%20iklim%20de%C4%9Fi%C5%9Fikli%C4%9Fi%20olarak%20adland%C4%B1r%C4%B1l%C4%B1r.

Global warming is one of the most shocking and irreversible realities of our https://gazetesu.sabanciuniv.edu/2015-05/cocuklar-sordu-levent-hoca-answered-climate-disruption-what-is-it

http://www.tki.gov.tr/bilgi/komur/enerji-ve-komur/232

https://www.wwf.org.tr/basin_bultenleri/guncel_haberler/?9081/5-haziran- cevre-greek-day-aciklamasi-air-pollution-tehlikeli-boyutleri-ulasti

After examining these and similar sources, one of the methods such as in-class discussion, interviewing experts and sharing them in the classroom, preparing and presenting a presentation on the subject, etc. is followed. Then the activity is continued.

Come on, come on. Let's design a project by helping our friend Miraç. Our project consists of three parts:

Part One

In terms of thermal insulation of various house construction and insulation materials such as briquettes etc.
Examination of

Selecting the most efficient and economical material in terms of

thermal insulation Part Two:

Investigation of fuels used for heating through interviews

Evaluation of the investigated fuels in terms of environmental damage, efficiency and economy

Part Three

Preparation of a column graph showing the relationship between the material selected for thermal insulation and the type of fuel selected

Preparation of a bar graph showing the relationship between the selected fuel type and air pollution

Preparation and presentation of an information poster containing research data and prepared graphics

3. STAGE IDEA GENERATION: (30 min.)

In this section, ideas about the problem situation are generated. All ideas are noted down. The idea is decided by a vote.

Preliminary Preparation: Before the activity, students are divided into groups of 5-7 students. The groups can sit in a circle, semi-circle, etc. close to each other.

Lesson Flow: The aims of the activity are reminded. It is reminded that each group should distribute tasks for the purpose. It is stated that democratic ways will be used in the voting and selection of topics.

What each group must do:

Selection of 1 street of briquette houses

Preparation of questions for the interview with the selected street dwellers

(Interview questions should include "type of fuel used, amount of fuel used in

http://www.tki.gov.tr/bilgi/komur/enerji-ve-komur/232

1 year and
financial expense").

Selecting the ones that the majority of the group wants by voting from the prepared questions

Brain about research topics to be done about thermal insulation materials storm storming

(Insulation materials efficiency and their affordability de criterion as must be present).

Brainstorming about research topics to be done on fuels used for heating

(Efficiency, environmental impact and affordability of fuels should also be included as criteria).

Selecting the research topics proposed by the group members from among those desired by the majority of the group

An equal distribution of tasks among volunteers who want to conduct research and interviews

4. STAGE PROTOTYPE CREATION: (80 min.)

Preliminary Preparation: Since the students are moving on to the application part, they can prepare materials suitable for the designs they have planned (Example: computer, colored pencils, colored papers...)

Course Flow:

In this section, students continue to work in groups;

They prepare the interview questions they have chosen either by writing them by hand or by using computer programs to print them.

They are expected to conduct the interview with at least 10 residents living on the street of their choice.

The research on thermal insulation materials is expected to be conducted in the light of the selected topics.

The information learned as a result of the research is summarized and turned into a report. In the report, the group is expected to select the most efficient and economical material in terms of thermal insulation and to state this.

The research on fuels used for heating is expected to be conducted in the light of the selected topics.

The information learned as a result of the research is summarized and turned into a report. In the report, the efficiency of the fuels, the damage they cause to the environment and their economic efficiency are evaluated and one of them is expected to be selected by the group and stated in the report.

They are expected to prepare the following two bar graphs by examining interviews, research and reports at the same time:

A column showing the relationship between the material chosen for thermal insulation and the type of fuel selected graph

A bar chart showing the relationship between the selected fuel type and air pollution

They can use paper, pencil, ruler, etc. to prepare the graph,
They can also use computer-based programs. Example computer applications:

Brain about research topics to be done about thermal insulation materials

Microsoft Office applications, Canva website, Notion Charts website...

Students are expected to review the scientific data obtained from their research and prepare an information poster. The poster can be prepared with colored pencils, stationery products or visualized using infographic programs (Canva, Piktochart, Creately, etc.). If there is additional information deemed necessary by the group, it should be added.

Prepared Graphs,

Important Information in Reports, Fuel

Recommendation,

Insulation Material Recommendation,

The Relationship Between Gases Emitted by Fuel Use and Environmental Pollution

The prepared poster is expected to be presented in the classroom by all groups and feedback is expected. Based on the feedback, necessary corrections can be made on the poster if necessary.

In order for the prepared poster to be delivered to the residents of the street, it should be hung by the group members on the notice boards visible to everyone on the street or sent digitally.

Profession, Duties and Responsibilities: The teacher introduces the professions of climate scientist and climate engineer. It is recommended to use materials such as videos, visuals, magazine articles, etc.

5. PHASE TRIAL: (10 min.)

Before presenting to the whole class, the groups prepare their presentation flow including their posters, reports and graphics. And they check whether the prepared poster matches their previous research. Corrections are made if necessary. They distribute tasks. They complete their final checks.

6. STAGE PROTOTYPE PRESENTATION: (20 min.)

Presents the poster summarizing the topic and their research to their classmates. They deliver the poster to the residents of the neighborhood through digital means or by hanging it on the notice board of the street.

7. STAGE EVALUATION: (10 min.)

There are two types of evaluation. These evaluations are as follows:

All groups evaluate and score members of other groups according to the peer evaluation scale.

The teacher evaluates and scores the presentations of all groups according to the product evaluation scale.

Peer Assessment Scale					
Criteria	5	4	3	2	1
He used his voice and body language effectively.					

He spoke in an audible voice.					

He pronounced the words correctly.					
He emphasized, paused and intoned.					
He made eye contact with the audience.					
He spoke fluently and clearly.					
He spoke with gestures and facial expressions.					
He spoke without doing it again.					
His speech was proper etiquette.					
He completed his speech within the specified time.					
Used newly learned words appropriately and appropriately.					
They conveyed their feelings and thoughts effectively.					
Score					
TOTAL SCORE					

Teacher Scale / Product Evaluation Scale			
	Very good 3 Points	**Successful 2 Points**	**Improvement Required 1 Point**
Presentation Skills	Product can elaborate, use body language well and communicate with the audience. ( )	Presentation during the exciting but sufficient knowledge about its subject he owns it, can complete the presentation on time. ( )	Excited and does not know / cannot express important information about the project. Also uses too little/too much time. No it's not interacting in any way. ( )
Group Communication Between	The group is a preliminary study of the interaction and working environment in everyday life. Determining the tasks in the group is a preliminary step in the process. There must be fulfillment/questioning and joint decision-making. ( )	A group comes together to do a specific task and takes responsibility for the task and responsibility. compleeted it together. There is poor communication or cooperation between them. ( )	Tasks among the group has not been defined, and what has not been defined in the face of tasks did not react. In this process conflicts may occur but if these conflicts are not resolved, group skill is evaluated negatively. ( )

Teacher Scale / Product Evaluation Scale			
	Very good 3 Points	**Successful 2 Points**	**Improvement Required 1 Point**
Time Management	Time management from the beginning of the process to the end as much as the individual or Group in all of the evaluations as implemented correctly and deadlines and deadlines were met. ( )	Attention was paid to the time management process, but due to different reasons that arose disruptions and delays have occurred. ( )	Dates were not set, were not respected or the mission never materialized. ( )
Interview and reports written as a result of research	Interview questions are clear, understandable and relevant. Reports summarize research and contain accurate and reliable information.	Interview questions were prepared in relation to the topic. The reports summarize research and contain accurate and reliable information.	Interview questions are irrelevant to the topic. Reports are summaries of research and contain irrelevant information.
Information poster	The poster uses original designs that appeal to the eye. It is clear and understandable. It includes fuel proposal, insulation material proposal, gases emitted as a result of fuel use and the relationship between environmental pollution.	Eye-appealing and original on the poster designs were used. The fuel proposal, insulation material proposal, gases emitted as a result of fuel use and the relationship between environmental pollution are included. However, it is not clear and understandable.	The poster includes a fuel proposal, an insulation material proposal, and the relationship between gases emitted as a result of fuel use and environmental pollution. However, it is not clear and understandable. Originality is low.
The relationship between gases emitted as a result of fuel use and environmental pollution	Made in in line with research Explains the relationship between gases released by fuel use and environmental pollution in a clear and understandable way. Gives place to cause and effect relationships. Has suggestions to reduce environmental pollution.	Explains the relationship between the gases released by fuel use and environmental pollution in a clear and understandable way in line with the researches conducted. Gives place to cause and effect relationships. Does not have suggestions to reduce environmental pollution.	Made in in line with research fuel use released gases and environmental pollution relationship tells in a clear, understandable way. Does not include cause-effect relationships. Environment pollution reduce for the purpose of the project.
Total			

STAGE 8 DEVELOPMENT: (10

In the presentation and evaluation parts of the work, the groups develop the parts that they think are missing or need to be corrected. If they wish, they can share the final version with the class again.

SOURCE

- Canva (2020). Retrieved from Canva: https://www.canva.com/tr_tr/
- Creately. (2020). creately: Retrieved from https://creately.com/
- Environmental Problems | Air Su Soil Pollution | Global Warming. Retrieved from https://www.fikir.gen.tr/cevresel-sorunlar-hava-su-toprak-kirliligi-kuresel-isinma/
- Children asked, teacher Levent answered: What is climate change? (2015, October 23). Gazete Su: Retrieved from https://gazetesu.sabanciuniv.edu/2015-05/cocuklar-sordu-levent- hoca-cevapladi-iklim-degisikligi-nedir
- Construction of briquette houses continues in Idlib Source: Construction of briquette houses continues in Idlib Ediyor . (2020, May 10). Haksöz News: Retrieved from https://www.haksozhaber.net/idlibde-briket-evlerin-insasi-devam-ediyor-126597h.htm
- Climate Amendment And Renewable Energy. (2021). Climate Bu: http://climatechange.boun.edu.tr/iklim-degisikligi-ve-yenilenebilir-enerji/#:~:text=Yukar%C4%B1da%20da%20bahsetti%C4%9Fimiz%20gibi%20fosil,da%20iklim%20de%C4%9Fi%C5%9Fikli%C4%9Fine%20sebep%20olmaktad%C4%B1r.&text=Bu%20olumsuz%20sonu%C3%A7lar%20iklim%20de% adresinden alındı
- Notion Charts (no date). Notion Charts: https://www.notion.vip/charts/ Retrieved from
- OLGUN, Z., AKTAN, M., & UÇAR, N. (2020, July). Energy and Coal. Turkish Coal Enterprises Corporation: Retrieved from http://www.tki.gov.tr/bilgi/komur/enerji-ve- komur/232
- Abstract Evaluation Form. (2014). Technology and Design: Retrieved from https://tasarimdersim.blogspot.com/2015/02/oz-degerlendirme-formu.html
- piktochart. (2020). piktochart: Retrieved from https://piktochart.com/
- pxHere. (2020). pxHere: Retrieved from https://pxhere.com/tr/photo/1549165
- pxHere. (2020). pxHere: Retrieved from https://pxhere.com/tr/photo/613809
- CLEAN AIR PUBLIC SPOT. (2018, December 19). Ministry of Environment and Urbanization: Retrieved from https://egethm.csb.gov.tr/temiz-hava-kamu-spotu-duyuru-367390
- WWF-Turkey June 5th Environment Day Statement: 'Air pollution has reached dangerous levels'. (2019, June 5). wwf: Retrieved from https://www.wwf.org.tr/basin_bultenleri/guncel_haberler/?9081/5-haziran-cevre-gayre-aciklamasi-hava-kirliligigi-tehlikeli-boyututlara-ulasti

How easy it is to measure

Course Title:	Science	Subject:	Respiratory System Health

Science Outcomes

F.6.2.4.1. Explains the functions of the structures and organs that make up the respiratory system using models.

a. Know how the volume of the lung changes during breathing.

F.6.6.3.1. Discusses what needs to be done for the health of systems based on research data.

a. Investigates how much lung volume should be in a healthy adult.

Mathematics Outcomes

M.6.3.5.2. Associates liquid measurement units with volume measurement units.

M.6.3.5.3. Solves problems related to liquid measurement units.

Engineering Gains:

MTB1 - Defining the design problem needed in daily life and determining the qualities and possible obstacles that the design must have in order to be successful.

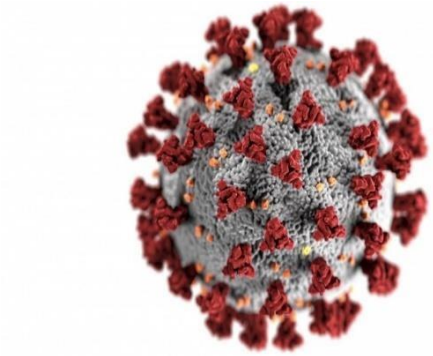
MTB2 - The student determines the stages required to produce the product to be designed and presents the product appropriately.

Social Product Outcomes:

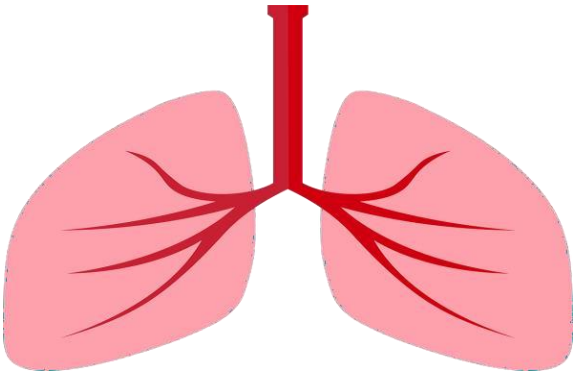
Communicates effectively with groupmates, shares ideas and actively participates in group work.

The student presents the designed product to the class in a clear and understandable way.

STAGE 1 SCENARIO: (15



The image on the left is of the Covid-19 virus. Accessed from https://pxhere.com/tr/photo/1608792 on 28/01/2021



The image on the right is a drawing of the lung organ. Accessed from https://pixabay.com/tr/illustrations/nefes-akci%C4%9Ferler-respiratory-5883697/ on 28/01/2021.

Our lungs are the organ that performs the vital respiratory function for our body. This organ, which is protected by our ribs in our rib cage and consists of two lobes, cannot work at full capacity for some reasons. These reasons can be caused by microscopic organisms such as bacteria and viruses or by environmental factors such as smoking, polluted air, etc. These problems cause the used volume of our lung volume to decrease.

The teacher will show a video about our lungs and their health, similar to the example videos below.
can show videos.

https://www.youtube.com/watch?v=npJCBJAIA9k

https://www.youtube.com/watch?v=9gw3N_GUXeg

We have had lung diseases throughout history. Examples of these include periodic tuberculosis outbreaks, Spanish flu, Pneumonia, influenza and the Covid-19 disease that everyone knows well. These diseases generally target my lungs and cause a decrease in lung capacity. For this reason, the lungs, which cannot work with full efficiency, cannot provide the correct exchange of respiratory gases in the blood. This situation shows its harmful effects on all our cells.

One of the most common symptoms of the COVID-19 virus, which is one of the most common viral diseases affecting humanity today and is transmitted through the respiratory tract, is a decrease in lung capacity and inflammation. People with this disease suffer from shortness of breath as their lung volume decreases. And as the disease progresses, lung volume decreases so much that the body may become unable to breathe on its own and may require a respirator.

2. PHASE PROBLEM: (15 min.)

Throughout human history, there have always been different epidemics. Epidemics affecting thousands of people and spreading all over the world have left their mark on minds. However, humanity has always found a cure, our scientists have developed medicines and our healthcare professionals have worked hard. The same is happening today.

The disease that the whole world closely follows and scientists are constantly We can follow the harmful effects of the Covid-19 pandemic every day from the news, television and our acquaintances. While it can be overcome without showing symptoms, we often hear that there are people who live severely. One of the symptoms of Covid-19 disease, which is known to be transmitted through respiration, is shortness of breath, that is, a decrease in lung volume.

For detailed information on the subject, videos can be accessed from the Ministry of Health's link below:

https://covid19.saglik.gov.tr/TR-66171/sosyal-medya-videolari.html

The aims of this event are as follows:

Design and construction of a simple, convenient and economical device to study the change in lung volume

Preparing a table showing our age range and the required lung volume (Table 1)

Preparation of a table consisting of the results we found by measuring with the device (Table 2)

Evaluation of the measurement results (Table 2) according to Table 1

3. STAGE: IDEA GENERATION: (80 min.)

In this section, ideas about the problem situation are generated. All ideas are noted down. The idea is decided by a vote.

Preliminary Preparation: Before the activity, students are divided into groups of 5-7 students. The groups can sit in a circle, semi-circle, etc. close to each other.

Lesson Flow: The groups are told that during the activity they will design an instrument to measure lung volume and then they will make the real thing. It is announced that they will make evaluations as a result of their measurements.

What is expected of each group is as follows:

Brainstorming about the instruments used to measure lung volume

Investigating the mechanisms of instruments for measuring lung

volume Here are sample links to help you with your research:

https://www.amerikanhastanesi.org/solunum-fonksiyon-laboratuvari#:~:text=Spirometer%20ad%C4%B1%20verilen%20cihaz%20ile,ak%C4%B1m%20ve%20vol%C3%BCmleriyle%20%C3%B6l%C3%A7%C3%BClmesi%20i%C5%9Flemidir.

http://www.nefesalalim.com/15/genel/93/solunum-fonksiyon-testleri-sft- why-why-how-to-do-to-our-patients

https://www.memorial.com.tr/saglik-rehberi/akciger-hastaliklari-solunum- test-detectable

http://cdn.istanbul.edu.tr/FileHandler2.ashx?f=solunum-fizyolojisi.pdf

Discussing how their own designs should be as a result of their research, which materials can be used

If necessary, preliminary drawings and doodles to help each other communicate their ideas
to make

Voting to reach a decision, the idea that the majority of the group supports find

To estimate the relationship between age range and required lung capacity as

a group To tabulate their estimates.

4. STAGE PROTOTYPE CREATION: (80 min.)

In this section, the design is concretized through the idea produced.

Preliminary Preparation: As the students move on to the application part, they can prepare materials suitable for the designs they have planned. (For example: computer, colored pencils, colored papers, cables, pipettes, volume containers, liquid types, balloons, bags...)

Lesson Flow: In this section, all groups should draw their designs and concretize their instruments for measuring lung volume.

The expectations from all groups are as follows:

Drawing: Draw the design of an instrument for measuring lung volume.

Drawing can also be done with pen and paper, SketchUp, Paint 3D, AutoCad, AutoDraw, etc. computer drawing programs can also be used.

Physical Design: Bringing together the materials appropriate to their design and creating the tool.

As the product emerges, the material can be changed if the majority of the

group wishes. To investigate the relationship between age range and required

lung capacity

To check whether the data obtained as a result of the research coincide with the predictions they made beforehand

As a result, we prepared a table describing the relationship between age range and required lung capacity (Table 1)

Prepare a table to record the measurement results of the instrument (Table 2).

Profession, Duties and Responsibilities: Information about Biomedical Engineering is given. Information about academic education processes, working conditions, profession introduction videos, etc. are given. Sample materials:

https://biyomedikal.aku.edu.tr/genel-bilgiler/

https://uskudar.edu.tr/shmyo/biyomedikal-cihaz-teknolojisi

https://www.youtube.com/watch?v=40-vmuPJoEU

https://biyomedikal.cu.edu.tr/cu/about/bolum-baskanindan

5. PHASE TRIAL: (15 min.)

Before presenting to the whole class, the groups check the design drawing of the instrument for measuring lung volume and the instrument itself. They measure the lung volume of each group member and take notes in Table 2. They make a final check for Table 1 to see if it is compatible with their research. They distribute tasks for the presentation to the class. They make corrections if necessary. They complete their final checks.

6. STAGE PROTOTYPE PRESENTATION: (20 min.)

All groups pay attention to the following steps while making their presentations:

They share with the class what they have learned about biomedical devices from their research through the design drawings they have prepared.

They describe in detail the materials they used and the process of designing the tool. They state.

They try out their lung volume measuring instruments in front of the class again. For this, they measure the lung volume of a friend who volunteers.

They evaluate the measurement results according to the data in Table 1.

7. STAGE EVALUATION: (10 min.)

Evaluate the data in Table 2 according to Table 1. They make comments. All groups evaluate and score the products of other groups according to the evaluation rubric. There are two types of evaluation. These evaluations are as follows:

The Whole groups other groups members Peer evaluation to scale evaluates and scores them accordingly.

The teacher evaluates the presentations of all groups according to the product evaluation scale and scores.

Peer Assessment Scale

Criteria	5	4	3	2	1
He used his voice and body language effectively.					
He spoke in an audible voice.					
He pronounced the words correctly.					
He emphasized, paused and intoned.					
He made eye contact with the audience.					
He spoke fluently and clearly.					
He spoke with gestures and facial expressions.					
He spoke without doing it again.					
His speech was proper etiquette.					
He completed his speech within the specified time.					

Criteria	5	4	3	2	1
Used newly learned words appropriately and appropriately.					
They conveyed their feelings and thoughts effectively.					
Score					
TOTAL SCORE					

Teacher Scale / Product Evaluation Scale			
	Very good 3 Points	**Successful 2 Points**	**Improvement Required 1 Point**
Presentation Skills	Product can elaborate while explaining, can use body language well during expression and with the audience contacting them. ( )	Presentation is excited during the presentation but has enough knowledge about his/her topic and can complete the presentation on time. ( )	Excited and does not know / cannot express important information about the project. Also uses too little/too much time. Does not interact in any way. ( )
Intergroup Communication	The group is a preliminary study of the interaction and working environment in everyday life. In the group identification of tasks, In the process your duties There must be fulfillment/questioning and joint decision-making. ( )	The group came together to do a specific task and completed the task and responsibility together. There is poor communication or cooperation between them. ( )	The group did not define tasks among themselves and did not react to tasks that were not done. Conflicts in this process may be possible, but if these conflicts are not resolved, group skills may be is considered as. ( )
Time Management	Time management from the beginning of the process to the end in all individual or group assessments until implemented correctly and deadlines and deadlines were met. ( )	Time management process was taken into consideration, but due to different reasons due to disruptions and delays. ( )	Dates were not set, were not respected or the mission never materialized. ( )

Measurement of lung volume drawing and physical design of the instrument	The drawing of the device is clear, three-dimensional, and made in accordance with the rules appropriate to its purpose. The prototype is very close to the drawing. The tool works as intended.	The drawing of the tool is clear, its purpose appropriate following the rules. But it is not three-dimensional. It is prototyped very close to the drawing. The tool is used is working properly.	The drawing of the tool is clear, its purpose appropriate rules and it's made accordingly. But it is not three-dimensional. It is prototyped so that it does not resemble a drawing. The tool is used is working properly.

Teacher Scale / Product Evaluation Scale			
	Very good 3 Points	**Successful 2 Points**	**Improvement Required 1 point**
Age range and required lung capacity relationship Table 1	Table 1 is designed in a clear and understandable manner, containing accurate information in line with the research conducted.	Table 1 in line with research, designed to contain accurate information. But it is not comprehensible.	Table 1 designed on the basis of research. But it is not understandable. It doesn't contain accurate information.
Table 2 prepared to record the measurement results of the instrument	Table 2 has been prepared in a clear and understandable manner, containing accurate information in line with the research conducted. designed. Measurement results are reliable.	Table 2 in line with research, designed to contain accurate information. But it is not understandable. Measurement results are reliable.	Table 2 in line with research, accurate information containing designed in such a way. But it is not understandable. Measurement results is not reliable.
Table 2 to Table 1 According to Interpretation	Table 2 and Table 1 were prepared with clear, understandable and accurate information. The data in Table 2 are interpreted correctly according to Table 1.	Table 2 and Table 1 were prepared with clear, understandable and accurate information. The data in Table 2 is misinterpreted according to Table 1.	Table 2 and Table 1 are clear and understandable. However, they do not contain accurate information. The data in Table 2 is more accurate than Table 1. wrong interpreted.
Total			

8. STAGE DEVELOPMENT: (10 min.)

In the presentation and evaluation parts of the work, the groups develop the parts that they think are missing or need to be corrected. If they wish, they can share the final version with the class again.

SOURCE:

- Lung Diseases Can Be Determined With Respiratory Test (2021, JAN 28).

Retrieved from MEMORIAL: https://www.memorial.com.tr/saglik-rehberi/akciger-hastaliklari- breathing-test-to-determine.
- AVCI, P. D. (no date). Biomedical Engineering. ÇUKUROVA UNIVERSITY: Retrieved from https://biyomedikal.cu.edu.tr/cu/about/bolum-baskanindan
- About Biomedical Device Technology. (2021). Üsküdar University: Retrieved from https://uskudar.edu.tr/shmyo/biyomedikal-cihaz-teknolojisi
- Biomedical Engineering. (2019). AFYON KOCATEPE UNIVERSITY: Retrieved from https://biyomedikal.aku.edu.tr/genel-bilgiler/
- Canva (2020). Retrieved from Canva: https://www.canva.com/tr_tr/.
- creately. (2020). creately: Retrieved from https://creately.com/.
- DEMIR, P. D., & YILDIRIM, P. D. (2019). RESPIRATORY FUNCTION TESTS (SFT) TO OUR PATIENTS WHY, HOW DONE? . TUSAD

Retrieved from http://www.nefesalalim.com/15/genel/93/solunum-fonksiyon-testleri-sft- why-why-nasil-yapilir.

- Fen Sciences Lesson Teaching Program. (2018). MEB: http://mufredat.meb.gov.tr/Dosyalar/201812312311937-FEN%20B%C4%B0L%C4%B0MLER%C4%B0%20%C3%96%C4%9ERET%C4%B0M%20 Retrieved from PROGRAM2018.pdf.
- istanbul arel university. (2019, July 16). Biomedical Engineering. youtube: Retrieved from https://www.youtube.com/watch?app=desktop&v=40-vmuPJoEU
- Morpa Kampüs. (2015, May 7). Grade 6 - Morpa Kampüs - Respiratory System Organs Youtube Retrieved from https://www.youtube.com/watch?app=desktop&v=npJCBJAIA9k received.
- Ocean intelligent teaching. (2011, December 30). Smart Teaching System Respiratory Tracts Animation youtube https://www.youtube.com/watch?app=desktop&v=9gw3N_GUXeg Retrieved from
- piktochart. (2020). piktochart: Retrieved from https://piktochart.com/.
- pixabay. (2021, January 6). pixabay: Retrieved from https://pixabay.com/tr/illustrations/nefes- lung%C4%9Fers-respiratory-5883697/.
- pxHere. (2020). pxHere: https://pxhere.com/tr/photo/1608792 from received.
- INHALATION PHYSIOLOGY (history none). ISTANBUL UNIVERSITY: Retrieved from http://cdn.istanbul.edu.tr/FileHandler2.ashx?f=solunum-fizyolojisi.pdf
- INHALATION FUNCTION LABORATORY. (2021). American hospital: https://www.amerikanhastanesi.org/solunum-fonksiyon-laboratuvari#:~:text=Spirometer%20ad%C4%B1%20given%20device%20and%20vol%C3%BCm%20and%20vol%C3%BCm%20with%20C3%B6l%C3%A7%C3%C3%BClmesi%20i Retrieved from %C5%9Flemidir.
- Social media videos. (2020, June 27). Ministry of Health Covid-19 Information Page: Retrieved from https://covid19.saglik.gov.tr/TR-66171/sosyal-medya- videolari.html.

Extracting the Earth's Water

Course Title:	Science	**Subject:**	Pressure
Author:	Cemre Aybüke Akyüz		

Science Outcomes:

F.8.3.1.2. Predict the variables affecting fluid pressure and test their predictions It does.

F.8.3.1.3. The pressure properties of solids, liquids and gases in daily life and technology gives examples of applications.

Mathematics Outcomes:

M.7.1.4.3.Analyzing real life situations and determining whether two multiplicities are proportional or not Decision gives.

M.7.1.4.6. Decides whether two multiplicities are inversely proportional by examining real-life situations.

Technology Design Gains:

TT. 8. C. 3. 4. Designs a product using the engineering design process.

TT. 8. D. 1. 3. Applies the design planning process.

TT. 8. D. 1. 4. Creates an original design model or prototype.

TT. 8. D. 1. 5. Evaluates the product he/she designed.

TT. 8. D. 1. 6. Reconstructs the designed product (model or prototype).

TT. 8. B. 1. 1. Makes draft drawings for design.

Engineering Outcomes:

Organize their own working group and environment to support the learning process.

It uses a conscious design process to generate ideas, test theories, create innovative artifacts or solve real problems.

Develop prototypes as part of an iterative design process. Apply

design processes as a team member.

Applies engineering design methodologies.

Prepares the prototype of the product.

1. STAGE SCENARIO: (5 min.)

When the teacher enters the classroom, he asks the students, "Do you know if there are any lakes in Turkey that are drying up?

In order to support this, the linked news is projected on the smart board and shared with the students.

https://www.youtube.com/watch?v=-H5y2DFMjaM&t=3s

After examining the source, the teacher shares the following visuals and news with the class:

Kilis Seve Dam

Before

The post

The Southeastern Anatolia Region, where temperatures remain above seasonal norms, is experiencing the driest winter season of the last 44 years. Despite the end of January, no rainfall has fallen in the region and the water in the lakes has receded due to drought. The Seve Dam, which meets the water needs of Kilis and overflowed due to the rainfall in 2012, has only a 10 percent occupancy rate this year. When the water receded, the old Kilis-Gaziantep highway, which was flooded with the completion of the dam, emerged and started to be used by farmers in the region. The lake, which used to be used for fishing and picnics, can be crossed by vehicle and on foot.
Gaziantep Chamber of Agriculture President Kenan Seçkin said that very difficult days await the region due to drought and stated that climate change is seen due to global warming and that farmers should be supported due to drought. Stating that desertification is expected in the Southeastern Anatolia Region, Seçkin said; "Really difficult days are waiting for us. Our scientists have already announced that desertification is expected in the Southeastern Anatolia Region, including Gaziantep, in the last 50 years.

It seems inevitable that there will be a drought this year. Citizens are also fed up with the drought. We dig underground like a mole to find underground water to water our trees.

After analyzing the news report, the teacher asks the following question to the class:

What do you think could be the problems encountered while extracting groundwater? (Students should be able to identify the

is directed to the relationship of pressure with depth).

Su the problem of solve for Wha can be

The teacher then divides the students into groups of 4-5 students.

2. PHASE PROBLEM: (5 min.)

You are an engineer who wants to bring water to a dry lake. You want to deliver water from the underground water source located at a depth of about 40 meters to the permeable land surface with the help of a pump, what kind of system would you design for this? Design your project by considering the terrain structure, water pressure and distance. While students are making their designs, limitations such as time and cost are mentioned. Students are asked to consider the relationship between the height difference between the source and the settlement, the distance between them, the terrain, the pressure of the water and the distance while designing their project. They are also reminded of the engineering design process that they will use effectively in the product development (deepening) part and are encouraged to include it in this process. The measurements given in the problem situation are realistic. The measurements that students will test their work are determined (40 cm depth is the source, 8 cm height is the height of the place to be reached). Criteria such as whether it carries water or not, how long it takes to bring the same amount of water up, and its cost can be used in evaluation. To test the work, a container of water that will be the source of water and a second container of water to be reached are placed at a depth determined in the classroom. It is tested.

3. STAGE IDEA GENERATION: (30 min.)

(Ideas are generated about the problem situation. All ideas are noted. The idea is determined by voting and the drawing is made).

Students are asked for other ideas that could be a solution to the scenario, these ideas are presented by the students in a democratic environment in the classroom. How close each idea comes to a solution is discussed with the brainstorming technique by making a drawing.

Students are expected to examine the depth difference between the source and the surface where the water will reach, the distance and the structure of the land in between, and design a vehicle with the most appropriate length and cost, considering that the pressure of the water will decrease as it goes up due to the distance. As the depth underground increases, the pressure of the water will increase.

4. STAGE PROTOTYPE CREATION: (30 min.)

The design is concretized through the idea produced.

Ingredients:

- 2 ballpoint pens
- Balloon
- Syringe
- Plastic bottle
- Hot glue gun
- Straw

Students realize their designs and the designs are tested. The results are discussed. Improvements that need to be made are discussed. Students' opinions are taken on the project that solves the problem with the least cost and the right pressure.

Image 1: Example of a water pump

5. PHASE: TRIAL: (10 min)

The prototype is tested and its operation and functioning are checked. Corrections are made if necessary.

6. STAGE PROTOTYPE PRESENTATION: (20 min.)

All groups present their products and are observed to see if they have done the given task.

7. STAGE EVALUATION: (10 min.) All groups evaluate and score the products of the other groups according to the evaluation rubric.

Rubric - 1

Product Evaluation Rubric					
Category.	**4**	**3**	**2**	**1**	**Score**
Script and design relatio nship	Emphasis on the required criteria, detailed information given.	Requested emphasis on criteria made, informed.	The desired criteria are emphasized.	The required criteria were not taken into account.	
Material use of	Materials are used in the right way, enriched with creativity	The materials are used in the right way.	Supplies are adequate and attentive unused.	The materials provided are not enough to create a product.	
Authenticity	The product is unorthodox, rich in creative ideas.	The product contains original ideas.	With limited creativity but following instructions prepared.	Only the instructions were followed.	
Cost	It's very cost-effective in the way it was planned according to the script,	Cost-effectively prepared according to the scenario	According to the scenario, the cost is not very affordable	The product is not entirely cost-effective	
Functionality	It follows the instructions, is very convenient and can draw a lot of water with pressure.	Following the instructions , it can draw a good amount of water with	In accordance with the instructions, it can draw little water with pressure.	The product is not designed according to the instructions, the water pressure of the product is insufficient.	

		pressure.			

Rubric - 2

Peer Evaluation Rubric					
Criteria	**5**	**4**	**3**	**2**	**1**
Your voice and body language effective used it.					
He spoke in an audible voice.					
The words are right pronounced.					
Emphasis, pause and intonation.					
He made eye contact with the audience.					
He spoke fluently and clearly.					
Gestures and facial expressions He spoke.					
Without doing it again He spoke.					
His speech is based on etiquette was appropriate.					
His speech stated completed in time.					
He can use the new words he has learned in place and appropriate used it.					
Emotion and conveyed his thoughts effectively.					
Score					
TOTAL SCORE					

8. STAGE DEVELOPMENT: (10 min.)

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks he/she is missing or needs to correct.

After this activity, students are expected to think of themselves as engineers by researching the agricultural products in the region and the water needs of those products, which crops were grown in which periods in the immediate vicinity and the GAP; they are expected to produce solutions by using the Engineering Design Process

on the importance of water, depletion of water resources, renewable resources, sustainable development, the problems we are experiencing now with environmental pollution, and the problems that may occur in the future with the depletion of clean water.

At the end of the activity, students make self-evaluation and group work evaluation. After the work, students can be directed to relevant competitions, patent, utility model registration, and related municipalities and non-governmental organizations for project ideas and products with original project ideas and products that may emerge, while protecting the rights of the students.

SOURCE:

- Make a water pump machine on November 1, 2020,
- https://www.youtube.com/watch?v=gLOsVrMhyzI&list=LL&index=28adresinde n accessed.
- Eyyüp Burun.(2018). Drought dried the lakes.on November 1, 2020,
- Retrieved from https://www.hurriyet.com.tr/gundem/kuraklik-golleri-kuruttu- 40716074
- Karademir,D., (2020). Kilis province humanitarian and economic geography(Doctoral Thesis).Istanbul University, Istanbul.
- TRT Haber. (2019).Turkey's drying lakes.on November 6, 2020,
- https://www.youtube.com/watch?v=-H5y2DFMjaM&t=3s, from acquired.

The waters are our home, we don't

Course Title:	Science	Subject:	Separation of Mixtures

Science Outcomes:

F.7.4.4.1.By selecting the appropriate one of the methods that can be used for the separation of mixtures applies.
F.7.4.5.4. pays attention to waste control in his/her immediate environment. Mathematics Outcomes:

M.7.1.4.3.Decides whether two multiplicities are proportional by examining real-life situations.

M.7.1.4.6. Decides whether two multiplicities are inversely proportional by examining real-life situations.

Technology Design Gains:

TT. 7. D. 1. 1. tells the design problem.

TT. 7. D. 1. 2. Research steps for the solution of the design problem applies.

TT. 7. D. 1. 3. Prepares a design plan.

TT. 7. D. 1. 4. Creates a model or prototype of the design.

TT. 7. D. 1. 5. Evaluates the design according to the specified criteria.

TT. 7. D. 1. 6. Reconstructs the designed product according to the evaluation results.

TT. 7. D. 2. 1. Presents the product or products to be exhibited.

Engineering Gains:

Organizes their work group and environment to support the learning process. Uses a deliberate design process to generate ideas, test theories, create innovative artifacts or solve real problems. Develop prototypes as part of an iterative design process. Apply design processes as a team member. Apply engineering design methodologies. Prepare a prototype of a product.

1. STAGE SCENARIO: (5 min.)

When the teacher enters the classroom, he asks the students, "Are the lakes around you clean or dirty?
"Do you know?" he asks a question.

To support this, public service announcements are projected on the smart board and shared with the students.

https://www.youtube.com/watch?v=vKAGSNWHb_0

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

After examining the resource, the teacher shares the following visuals and scenario with the class:

Zeynep lives in Nizip district of Gaziantep. When she passed by the Nizip stream in her area, she noticed that its color changed and a bad smell spread from the stream. This situation had a bad effect on the creatures living in that region. When he investigated the reason for this, he realized that the 69 km long Samözü Stream and its extension, Nizip Stream, which flows into the Hancağız Dam; The Samözü Stream, which is 69 km long and flows into the Hancağız Dam, and its extension, the Nizip Stream, were heavily polluted due to the fact that many large and small industrial facilities such as pistachio processing, slaughterhouses, soap, detergent, olive oil, etc. poured their wastewater directly into the Nizip Stream without treatment, and as a result of the use of the waters along the Samözü Stream - Nizip Stream route and in the Hancağız Dam reservoir for irrigation purposes by the local farmers, the plants became unproductive, diseased and dried up. She learned that the very bad odor that emerges during four seasons, especially in summer, affects the comfort and quality of life of the local people and that mass deaths of fish, etc. in the dam reservoir occur due to pollution and that no living creature can live in the water. Thinking that something should be done for this, Zeynep decided to build a device to clean the stream water with the materials she could find around her. She would make sure that the materials she would choose were economical, easy to find and natural.

After analyzing the news report, the teacher asks the following question to the class:

1. How should Zeynep solve this problem?
2. What are the causes of changes in the river?

Followed by teacher students 4-5 personality groups separates.

2. PHASE PROBLEM: (5 min.)

https://www.youtube.com/watch?v=vKAGSNWHb_0

Throughout the whole process, the teacher will ask his/her students to find solutions to the daily life problem of the destruction of nature and environmental pollution, which is one of the 21st century problems, by acting just like an environmental engineer and will be a guide in the process.

The teacher will ask the students to review the lesson "Separation of
The students are informed about the functioning of the linked scenario process. Limitations such as time and cost are mentioned while students are making their designs.

3. STAGE IDEA GENERATION: (30 min.)

(Ideas are generated about the problem situation. All ideas are noted. The idea is determined by voting and the drawing is made).

Students are asked for other ideas that can be a solution to the scenario, these ideas are presented by the students in a democratic environment in the classroom. How close each idea is to a solution is drawn and discussed with the brainstorming technique.

Students are expected to design a river cleaning vehicle of the most appropriate size and cost to separate solid (plastic, bag, etc.) and liquid wastes (oil, detergent, petroleum, etc.) separately, taking into account the buoyancy of water. For this purpose, attention should be paid to the fabric that can absorb oil but does not absorb water, is light, can bear weight and can be reused.

4. STAGE PROTOTYPE CREATION: (30 min.)

The design is concretized through the idea produced.

Ingredients:

- Pet Cup
- Straw
- Tire
- Toy Boat
- Fabric Samples (Nylon, Cotton, Fiber, Acrylic, etc.)
- Wool Rope
- Scissors
- Leğen
- Su
- Olive Oil
- Detergent
- Oil
- Bag Piece

Students realize their designs and the designs are tested. The results are discussed. Improvements that need to be made are discussed. Students' opinions are taken on the river cleaning vehicle that solves the problem with the least cost and the most appropriate weight.

5. PHASE TRIAL: (10 min.)

The prototype is tested and its operation and functioning are checked. Corrections if necessary
It is done.

6. STAGE PROTOTYPE PRESENTATION: (20 min.)

All groups present their products and are observed to see if they have done the given task.

7. STAGE EVALUATION: (10 min.)

The Whole groups other groups products evaluation rubric evaluates and scores them accordingly.

Rubric - 1

Product Evaluation Rubric					
Category.	**4**	**3**	**2**	**1**	**Score**
Script and design relationship	Detailed information with emphasis on the desired criteria given.	The required criteria are emphasized and information is provided.	Desired criteria emphasized.	The required criteria were not taken into account.	
Material use of	Materials are used in the right way, enriched with creativity.	The materials are used in the right way.	Supplies are adequate and attentive unused.	The materials provided are not sufficient to create products.	
Authenticity	The product is unorthodox, rich in creative ideas.	The product contains original ideas.	Prepared with limited creativity but following the instructions.	Only the instructions were followed.	
Cost	It's very cost-effective in the way it was planned according to the script,	It was cost-effectively prepared according to the script.	According to the scenario, the cost is not very affordable.	The product is not entirely cost-effective.	
Functionality	Following the instructions, very useful, the product can collect a lot of garbage.	Can pick up garbage according to instructions.	Cannot collect enough garbage according to instructions.	The product is not designed according to the instructions.	

Rubric - 2

Peer Evaluation Rubric					
Criteria	**5**	**4**	**3**	**2**	**1**
Your voice and body language effective used it.					
He spoke in an audible voice.					
The words are right pronounced.					
Emphasis, pause and intonation.					
He made eye contact with the audience.					

Unnecessary in conversation he didn't make noises, he spoke fluently.					
Gestures and facial expressions He spoke.					
Without doing it again He spoke.					
His speech was proper etiquette.					

Peer Evaluation Rubric					
Criteria	**5**	**4**	**3**	**2**	**1**
His speech stated while completed.					
He can use the new words he has learned in place and appro priate used it.					
Emotion an d thoughts effectively transmitted.					
Score					
TOTAL SCORE					

8. STAGE: DEVELOPMENT: (10 min.)

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

After this activity, students are expected to think of themselves as environmental engineers and produce solutions by using the Engineering Design Process on the importance of water, depletion of water resources, renewable resources, sustainable development, the problems we are experiencing now with environmental pollution, and the problems that may occur in the future with the depletion of clean water.

Students make self-evaluation and group work evaluation at the end of the activity. After the work, students can be directed to relevant competitions, patent, utility model registration, and related municipalities and non-governmental organizations for project ideas and products with original project ideas and products that may emerge, while protecting the rights of the students.

SOURCE:

- Ministry of Environment and Urbanization.(2020).Marine Pollution Public

Service Announcement.Retrieved from https://www.youtube.com/watch?v=WDFqZYLEvGU, on November 1, 2020.

- Euronews.(2015).Amazing invention that cleans waste oil from the sea.1 November 2020, https://www.youtube.com/watch?v=gEQZOeBffUoadresinden retrieved on November 2020.
- Evrensel.(2019) Industrial wastes poisoned Nizip Stream. Retrieved on November 1, 2020, from https://www.evrensel.net/haber/392471/sanayi-atiklari-nizip-cayini- zehirledi.
- Murat Aksoy.(2014). Sea without exhaustion 1 November 2020 in its history,
  Retrieved from https://www.youtube.com/watch?v=vKAGSNWHb_0.
- TMMOB Chamber of Chemical Engineers.(2013). Pollution in Gaziantep Samözü stream and Nizip stream has reached frightening dimensions. Retrieved on November 1, 2020, from http://www.kmo.org.tr/genel/bizden_detay.php?kod=1269&tipi=3&sube=0adr.
- TRT Haber.(2018).Floating trash bin Seabin.on November 1, 2020, Retrieved from https://www.youtube.com/watch?v=yAJIavzj4TIadresinden

Course Title:	Science	**Subject:**	Voice
Author:	Mehmet Cengiz		

1.1. Acquisitions belonging to the main discipline:

Science

F.6.5.1.1. Predicts the environments in which sound can propagate and tests his/her predictions.

F.6.5.4.2. Makes predictions to prevent the spread of sound and makes predictions tests.

F.6.5.4.3. Explains the importance of sound insulation.

1.2. Acquisitions belonging to STEM Disciplines:

Uses creativity skills to create an original product as a result of his/her work.

Entrepreneurship uses communication skills to create advertisements to market their product effectively.

Develops skills to work in groups and fulfill their role in a team. Engineering

and Design Skills:

Creates products for project work with innovation and invention skills. Visual

Arts

Makes 3-dimensional work using different materials.

Materials to be used

- Background cardboard,
- Cardboard,
- Cotton,
- Adhesive
- Glass lantern,
- Pump
- Alarm clock,
- Sand,
- Styrofoam (foam),
- Sponge,
- Wool,
- Fabric
- Carpet,
- Felt
- Glass wool

1. STAGE SCENARIO: (20 min)

The teacher enters the classroom with an alarm clock. He reads the following

story to the students: Once upon a time Apollo, the god of music, the arts, the sun, fire and poetry, and
There lived the god Pan. These two decided to have an instrument playing contest between them. They hired a referee to decide who played better. One of the judges was the mountain god Tmolos and the other was the king Midas.

When the day of the contest came, everyone was very excited. Pan, the god of the countryside, made beautiful sounds with his pipe, but Apollo's lyre, a harp made of silver, sounded better than any musical instrument. When Apollo started to play, everyone stopped and listened to him. When Pan and Apollo finished playing, it was time for the judges to choose the winner.

The mountain god Tmolos, one of the judges, gave the game to Apollo. But Midas gave the game to Pan at the end of the contest. God Apollo, who was very angry at this, said "the ear that cannot distinguish beautiful music cannot be a human ear, a donkey's ear suits you" and turned Midas' ears into donkey ears.

For a while, Midas hid the god's gifts in a big cone. But the barber who cut his hair finally saw his ears and learned the king's secret. The king told the barber to keep his secret, but could it fit in a human mouth? After going through pains and unbearable agony, the barber decided to tell his secret to a well. He leaned into the well and shouted, "Midas's ears are donkey ears!" (VIKIPEDI FREELY ANSYTHOLOGY, 2020)

But this secret, which the barber told thinking that no one would hear, was heard. King Midas was very ashamed and never appeared before his people again. The barber regretted that he had embarrassed him, but he was angry at the water for carrying the secret because he thought he had to tell it.

After the story, students are asked the following questions;

1) When the barber shouted into the well, how did the sound spread from there?

2) Can sound be heard everywhere?

3) If you were a barber, what kind of well would you tell the secret to so that no one would hear it?

2. PHASE PROBLEM:

At this stage, students are asked to test whether sound propagates in every environment based on the event in the story. It is stated that the sound of an alarm clock will be used instead of a glaze and students are asked to make a well using the materials provided. A cardboard box will be used as a well. Students will test whether they can hear the sound of the alarm clock by selecting the materials inside the box.

Work in groups according to class size. Each group can complete their well in 15 minutes.
prepares. In 5 minutes, shares the results with friends.

Process Steps:

1. For each group, an alarm clock, a cardboard box and a soundproofing material. substance is acquired.

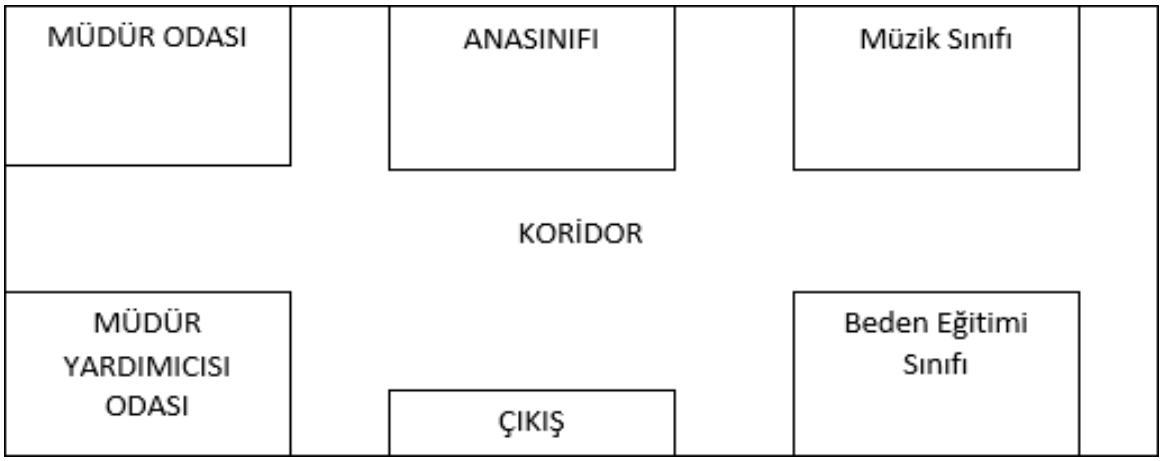
2. Chimes from the clock emerging your voice spread to prevent for one Model
designed, the model is tested.

3. The models created are compared with each other.

4. It is decided which model provides better sound insulation.

3. STAGE IDEA GENERATION: (20 min)

Draws the plan of the desired floor of the insulated school. Sample drawing is given below.



Makes the model. While making the model, it can make the whole floor or only one part of the world.

Students measure whether the sound comes out of the classrooms. They introduce the classrooms they built to their friends. They receive suggestions for improvement as a class.

4. STAGE PROTOTYPING:

(The design is concretized through the idea produced. (Drawing))

5. PHASE TRIAL: (5 min)

The prototype is tested and its operation and functioning are checked. Corrections if necessary
It is done.

Improves the product. The product in the figure is given as an example. Student groups develop their own
They will design according to the materials they choose.

6. STAGE PROTOTYPE PRESENTATION: (20 min)

All groups present their products and are observed to see if they have done the given task.

7. STAGE EVALUATION: (10 min)

All groups evaluate and score the products of the other groups according to the evaluation rubric.

Students are evaluated with a scale developed by the teacher for the evaluation of their products. The evaluation is based on 100 points. A total of 90 points are scored on the scale. The remaining 10 points are given as the average of the points received from other groups. Groups evaluate each other out of 10 points. Groups with low scores have to explain the reasons.

CHARACTERISTICS TO OBSERVE	MUST BE IMPROVED 5 POINTS	GOOD 7 POINTS	VERY GOOD 9 POINTS
Understanding the problem correctly			
To be able to produce appropriate solutions to the problem			
Making a work plan suitable for the project			
Distributing tasks within the group			
To be able to complete the model of your product			
Resemblance to the design of the product			
Introducing the product			
Establishing a relationship with the course in the presentation			
To be able to use presentation time			
MEDIUM TOTAL			
AVERAGE FROM OTHER GROUPS SCORE			
TOTAL			

8. STAGE DEVELOPMENT: (5 min)

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

SOURCE

(2018). Interaction of Sound with other Substances. In C. Çiğdem, G. Balçık, & D. Ö. Karaca, 6th Grade Science Textbook (pp. 183-190). Ankara: Sevgi Publications.

handmademoond Egg Cardboard Waste Baskets http://handmademoon.blogspot.com/2009/03/egg-carton-waste-baskets.html.

W I K I P E D I A FREE E N C Y C L O P E D I A . (2 0 2 0 , 12 14). VIKIPEDIA FREE on December 15, 2020 ANSYCYCLOPEDY WEB site: Retrieved from https://tr.wikipedia.org/wiki/Midas

Course Title:	Science	**Subject:**	Structures and organs of the circulatory system, structure and function of the heart, blood vessels, large and small blood circulation, blood groups, blood donation, circulatory system
Author:	Dilek Toktamis		

Science Outcomes:

F.6.2.3.1. Explains the functions of the structures and organs that make up the circulatory system using a model.

a. The four chambers of the heart, the structures that make up the heart, are mentioned without giving their names.

b. The names of the structures and valves that make up the heart are not included.

c. The working mechanism of the heart is not

mentioned. d. Pulse and blood pressure are

mentioned.

d. Lymph circulation is not mentioned.

F.6.2.3.2. Examines the large and small blood circulation on the diagram and explains their functions. Without going into the detailed structure of arteries, veins and capillaries, their tasks are specified.

Technological Gains:

Develops a draft design proposal for the solution.

Conducts research to develop a draft design proposal.

Determines the structure and features of the design to be realized by considering the results of the research.

Determines the methods and techniques to be used in the design

by experimenting. Explains the construction drawing of the design.

Plans and realizes the construction stages of the

design. Determines the criteria for the evaluation of

the design. Evaluates the design according to the general

characteristics.

Presents suggestions for changing and improving the design with justifications.

Records his/her experiences during the design process in his/her diary.

Shares with the class.

Engineering Gains:

Ability to apply knowledge of mathematics, science and engineering.

Ability to design and conduct experiments as well as data evaluation and interpretation skills. Ability to work in multidisciplinary teams.

Visual Arts Outcomes:

G.6.1.2. Uses different materials and techniques while creating a visual art work.

G.6.1.6. Makes short and long term drawings based on observation.

1. STAGE SCENARIO: (20 min.)

At the beginning of the lesson, the teacher asks the students some questions about the stethoscope and the invention of the stethoscope in order to prepare them for the lesson and to be able to talk about the KBAP (Knowledge Based Life Problem). The following questions can be asked: "If you were a doctor before the invention of the stethoscope, how would you listen to a patient's heartbeat? Answers are taken from the students and different experiences are shared. Continue with the following exercise: "Students can be asked to listen to each other's heartbeats by having them roll with cardboard." "The heartbeat can be listened to with the help of a stethoscope. The number of heartbeats can be determined from the carotid artery or pulse." The same procedures are repeated with running or jumping. The difference between the pulse rate per minute before and after running or jumping can be felt and the reason can be asked. The subject is progressed with similar questions. Then the following videos about blood circulation in the heart are shown.

https://www.youtube.com/watch?v=Vot7V7_2UoI&ab_channel=HappyLearningEnglish

https://www.youtube.com/watch?v=_qmNCJxpsr0&t=3s&ab_channel=GetSchooledNowCA

https://www.dailymotion.com/video/x4v3zsl

While watching the videos, the teacher asks the class, "What did we learn about the heart model and the functioning of the heart from the videos?" and discusses the functions and structure of the heart.

Structure of the Heart: The heart is located in the chest cavity, above the diaphragm and between the two lungs, behind the breastbone. It is a cone-shaped organ with its pointed end tilted to the left. The heart consists of fast, strong and involuntary muscles. It contracts and relaxes, allowing blood to move through the blood vessels. It acts as a pump in the body. It pumps blood into the body and collects it back from the body.

The heart has four chambers, two at the top and two at the bottom.

The lower chambers contract and relax more strongly than the

upper chambers.

The lower chambers are wider than the upper chambers.

There are valves between the upper and lower chambers that allow

blood to pass through. The left and right sides of the heart are divided

by a wall made of muscles.

The left and right sides of the heart are divided by a wall made of muscles.

Oxygen-rich blood on the left side of the heart and oxygen-poor blood on the right side is found.

The vessels that bring blood to the heart are connected to the upper chambers. Therefore, the blood coming to the heart is collected in the upper chambers.

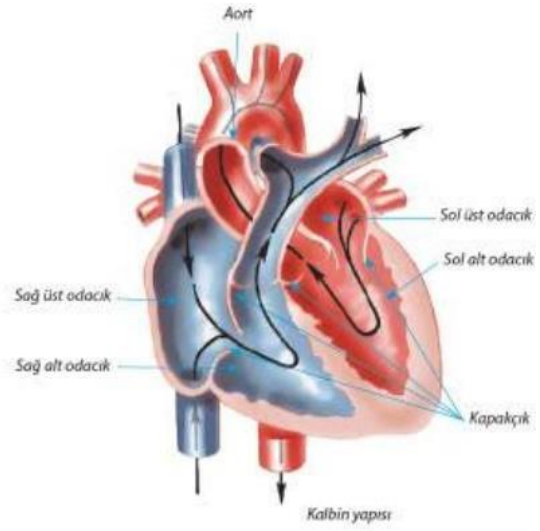


Figure 1. Structure of the heart

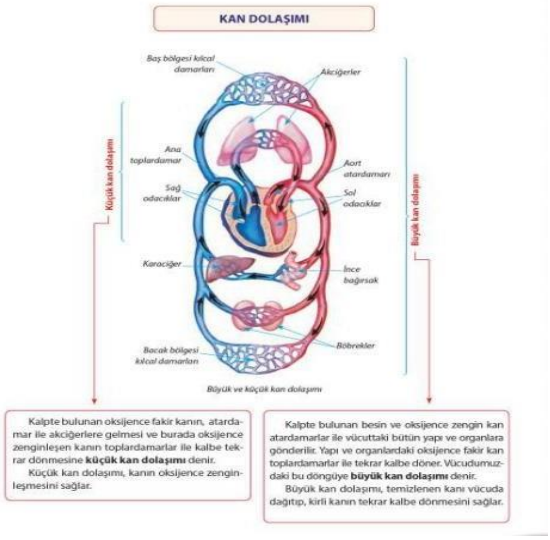


Figure 2. Small Blood Circulation - Large Blood Circulation

The above image was accessed on 2020-2021 Year 6th Grade Science Textbook Sevgi Publications 25.01.2021.

2. PHASE PROBLEM: (5 min.)

Gamze's father got sick. Gamze's parents went to the doctor. Gamze waited for them at home with her sister. Gamze was very anxious, she kept going to the window and watching for them. Her sister called her sister to her and said: "Our father's heart is a little tired, he needs to rest." Gamze hugged her sister. Her sister said: "I'll get you some milk." and went to the kitchen. When she came back, she saw Gamze asleep on the sofa in front of the window. She covered her and went into the other room. Gamze suddenly found herself in a dark tunnel. She went a little further and came across a cute little kitten. The kitten seemed to want Gamze to follow her. Yes, the kitty wanted Gamze to follow her. They started to move forward, the kitten in front and Gamze behind. They went through tunnels. Everything was like a big pot of spaghetti with tunnels all jumbled together. Gamze suddenly realized. This place was just like what Teacher Tufan had described in Science class. Gamze was traveling through the veins of a body. Gamze thought: "We are in a network that covers us from head to toe, from our head to our feet, from our pupils to our lungs and livers, from the marrow in our bones." Suddenly, she panicked. The kitten was moving towards the flow. Gamze could neither turn back nor go forward. She gathered her courage for a moment and decided to follow the kitty. "I think we are going to the heart, a great pump created from the strongest muscles of our body, which provides the flow of blood in our veins, which works non-stop and without rest," she sighed. He continued walking with excitement mixed with fear. He looked at his fist and thought, "That's it." The kitten turned around and said: "It weighs 230-300 grams." Gamze's mouth was agape, the kitten was talking. "It beats exactly 70 times a minute. In 24 hours, that is, in a day, all the blood in our body circulates 1000 times. It goes to the lungs, gets cleaned and spreads back into the body." As soon as the kitten said that, suddenly the space under their feet opened up and they started to fall in the space. They entered the heart through the right ventricle. In the following

process, a model was created to help Gamze inside the heart to get out.

Let's improve it. Let's get Gamze out of the compartment she's in. Of course Gamze is asleep and dreaming. Gamze will only wake up when she reaches the exit. Come on, let's wake Gamze up!

3. STAGE IDEA GENERATION: (40 min.)

Students are divided into groups of 4 or 5. First of all, the materials related to the heart model (materials of the activity) are introduced to the class. It is explained that the materials in the desired group can be preferred from the three groups of materials with the teacher's control and approval, or that additions can be made to the materials. They are told that the cutting and piercing tools to be used in the design can be used under the control of the teacher, and they are given information about safe use and shown how they can be used.

Materials Used

(Planning was made over one group. The amount of material should be increased according to the number of groups. 1*, 2* and 3* group materials can be used according to student level).

1. 3 plastic bottles (with lids), 4 bendable straws, 3 cups of water, red food coloring, insulating tape, play dough, cutting tool for making holes.
2. 4 plastic bottles (with caps), 180 cm long laying hose (to be divided into 4 equal parts), 1 non-brittle straw, red and blue food coloring, 2 file clamps, play dough, tape adhesive, some water, a piercing tool to make holes in the bottles and bottle caps, scissors to cut the laying hose.
3. 4 small balloons (about 5 cm in length), 2 large balloons (about 10 cm in length), 2 plastic bottle caps (2 holes should be made in each cap), 1 rubber ball, insulating tape, 2 IV sets, strong glue, silicone, silicone gun, utility knife, 2 plastic cups (2 plastic bottles can also be used), red food coloring and some water.

https://www.exploratorium.edu/snacks/re-engineering-circulatory-system The following two links are for teachers;

https://www.steampoweredfamily.com/activities/heart-model-heart-stem/

https://www.youtube.com/watch?v=WufDTu_LpV0&ab_channel=PakScienceClub

The teacher asks each group to discuss the question "What kind of a mechanism can we design to ensure the circulation of water (representative blood) colored with food coloring in the model they will prepare?". Each group is provided with reference books, magazines and tablets or computers, if available. They take a break to watch the videos below while doing their research and recording their findings.

https://www.youtube.com/watch?v=LZlV1ZGrtww&t=8s&ab_channel=MariaLanford

https://www.youtube.com/watch?v=aJRduIb5YS4&ab_channel=Fliplearn.com

They discuss the issues they notice about the heart model in the video. Attention is drawn to the circulation of clean blood and dirty blood. Afterwards, each group continues to test their knowledge with the help of questions:

How does the heart muscle

work? What is the

structure of the heart?

How does blood circulate in the heart?

Which of the materials given to us can we use in our model?

With the help of resource books, magazines or tablets distributed to their groups, students conduct their research and take notes as they search for answers to the questions. Before continuing the research, the teacher discusses the following questions with the class and gets answers:

What information do you have, what do you know?

What new knowledge will you need? What do you need to know?

What or who are your research sources?

How will you report your research results? You can report your report as a poster or lapbook.

Before the next lesson, each group takes notes on the mechanism they are going to design. In preparation for the next lesson, students are also expected to do research on the contribution of their profession to the solution of this problem. They record all the information that will contribute to their research.

At this stage, first, each student in the group shares their research findings with their groupmates. The materials that can be used for the solution of BTHP are introduced to the students. They brainstorm in their groups about the purposes and activities for which they have used these materials before. Then they share with the group members how and in what ways their profession can bring solutions to the solution of this problem. Students start to generate ideas for designs that they would like to create by taking into account the limitations that could be a solution to BHTP. Each idea generated by the students is recorded in a notebook. The teacher gives students 10 minutes for the idea generation process. In this part, the teacher needs to visit the groups in the classroom. He/she should check whether they are progressing in line with the achievements he/she wants from the students. The teacher can intervene in the groups to the extent he/she deems necessary. If necessary, he/she can share theoretical knowledge. However, these interventions should not affect students' creativity. Students review all their ideas through brainstorming and decide on the design they want to make by consensus. (5 minutes) If the students' design is out of the acquisition or a product that cannot be made with the given materials, guiding questions should be asked to ensure that they review their ideas again. In order to share the ideas created in different groups with the whole class, a short inter-group sharing is done before moving on to product development. Here, while the teacher is visiting the groups, students can share the design they have decided to turn into production with their teachers and after the teacher approves it, they can proceed to the product development stage.

4. STAGE PROTOTYPE CREATION: (40 min.)

Limitations: You can only use the materials provided in the box. If you want to use additional materials, you must inform your teacher before using them.

You must accurately show the path that the fluid (representative blood) will follow inside the heart.

Professions, Duties and Responsibilities: Graphic Designer: A specialist who can visualize an object or an idea by drawing it by hand or with technological tools. They usually work with specialists in advertising, public relations or photography.

In this project, it helps in designing the image of the model/design and gives an idea of which product can be used before realizing the project.

Basic Scientist: In our project, they check whether the mechanism they have created is working properly and they work in the formation of the model, they can check the cycle, the functioning of the model.

Cardiologist: A doctor from the Cardiovascular Surgery department can check the accuracy of the design of the model.

Reporter: Strong analytical and reporting skills are expected.

Material supervisor: The person who ensures that the materials required for the formation of the products are prepared at the desired time.

Researcher A person who conducts research and analysis and studies mechanisms.

Speaker The person presenting the project.

During the idea development process, students who receive production permission can start product development activities. Students are encouraged to draw the draft version of their products on isometric paper consisting of horizontally and vertically equally spaced dots. Students who benefit from isometric paper can draw their designs in three dimensions more easily. Then, they start to create their designs by choosing the appropriate materials for their groups from the material lists determined by the teacher. The teacher should visit the groups frequently and supervise the process with questions. He/she can address the class and give the necessary auxiliary information.

At this point, students put forward their ideas and solutions and present several different ideas they have developed. They evaluate each idea as a group. Together they fill in the blanks given in the following lines

The easiest idea to implement .....

Difficult idea to implement .....

The craziest idea .....

Most creative idea..... Our favorite idea.....

Each group records the superior aspects of their chosen idea. At this stage, the following questions can be used in addition:

Which idea was superior to the others and you decided to use it?

How can we realize this idea with a sketch drawing, thinking about the materials we will use?
we can draw?

At this stage, each group creates drawings of the product/design they will develop. Students are reminded that the drawings should include the materials to be used and should show them clearly. Each group shows its draft drawing to the teacher and receives evaluations and directions for improvement.

Finally, before moving on to product development, each group discusses whether the solution they will develop fits within the constraints of the BTHP. It is decided that it does,

product development is started with the materials. The teacher helps the groups who have difficulty in using some materials such as scissors.

Students test whether the first mechanism they have created works or not. If there is a problem and it is not working, students are encouraged to reflect and revise it with the following questions:

Has model making been achieved?

For each trial, did we calculate the time and record it? Have each group do a trial and record the time.

Which different materials would you like to use in your modeling?

Are there parts of other groups' modeling that you would like to add? What

can we do to keep the modeling organized?

Students' suggestions for solutions are listened to. Then the group tests whether these ideas work or not within the group.

Finally, the teacher gives feedback to the extent deemed necessary. completes it.

5. PHASE TRIAL: (10 min.)

In this week, children finally check their products. If they have problems, they share them with each other and try to solve them. Students can also get help from their teachers. If everything looks good, children put their products into action and put the finishing touches on them.

When children finish their work, they make associations to the limitations. Children should check their products against the constraints.

Let's say that each group should have a group name. The children are asked to talk about it and come up with a name, considering all possibilities. You can take time to come up with name sessions or you can use a way where the children come up with the group name the following week.

Then, they are reminded that the next lesson/week will be a presentation week. Each group fills in the evaluation forms.

6. STAGE PROTOTYPE PRESENTATION: (20 min)

All groups present their products and are observed to see if they have done the given task.

Each group presents their processes and products to the participants in a presentation environment. Thus, the groups have the chance to share their work with other level students, parents and teachers.

7. STAGE EVALUATION: (10 min)

The Whole groups other groups products evaluation rubric evaluates and scores them accordingly.

Rubric - 1

Ranked Scoring					
CATEGORIES	**Very Good - 4 Points**	**Good - 3 Points**	**Medium - 2 Points**	**Should be improved - 1 point**	**SCORE RECEIVED**
MODEL VIEW	Model view, drawing sketches quite appropriate.	The model appearance matches the picture sketches.	The model appearance is partly in line with the picture sketches.	The model appearance does not match the picture sketches.	
SUBJECT CONTENT	Student correctly identifies the application topic Understanding.	Student partially understands the application topic he got it right.	The student has a partial understanding of the application.	The student did not understand the application.	
MATERIAL USE	A wide variety of materials were used on a limited scale. (The model is very well prepared.)	Limited use of a variety of materials (model well prepared).	Materials used but sufficient (Model prepared.)	Material is underutilized but sufficient (no model prepared.)	
CREATIVITY	In the model/design model, the power of creativity utilized.	The model/design model utilizes the power of creativity.	In the model/design model, the power of creativity is not utilized much.	In the model/design model, the power of creativity is not utilized at all.	
TIMING	The model/design model was made in the limited time.	Model/design model after the limited time It was done.	The model/design model is more than limited time then it was done.	Model/design model could not be made.	
PRESENTATION	The group's presentation is very good. The subject matter is generally judge.	The group's presentation is good. The subject matter is generally judge.	Group presentation not enough. Mastering the subject Sort of.	Group presentation not enough. Mastering the subject It isn't.	
TOTAL					

Rubric - 2

GROUP EVALUATION FORM Group Name					
SKILLS	**Nothing**	**Sometimes**	**Mostly**	**Always**	**SCORE**
Group members help each other.					
Group members can share each other's thoughts. they listen.					
Each group member takes part in the work.					
Group members respect each other's ideas and efforts.					
Each member of the group discusses in interaction with each other.					

The members of the group shared their conclusions with each other. transmits.					
TOTAL					

8. STAGE DEVELOPMENT: (10 min.)

In the presentation and evaluation parts of his/her work, he/she improves the parts that he/she thinks are missing or need to be corrected.

Each group presents their processes and products to the participants in an organized presentation environment.

SOURCE:

- Middle School 6th Grade Science Textbook Sevgi Publications 3rd Chapter Circulatory System
- https://tr.wikipedia.org/wiki/Kalp
- https://www.scientificamerican.com/article/tissue-engineering-how-build-heart/
- https://www.youtube.com/watch?v=Vot7V7_2UoI&ab_channel=HappyLearningEnglish
- https://www.youtube.com/watch?v=_qmNCJxpsr0&t=3s&ab_channel=GetSchooledNowCA
- https://www.dailymotion.com/video/x4v3zsl
- https://www.youtube.com/watch?v=LZlV1ZGrtww&t=8s&ab_channel=MariaLanford
- https://www.youtube.com/watch?v=aJRduIb5YS4&ab_channel=Fliplearn.com
- https://www.exploratorium.edu/snacks/re-engineering-circulatory-system
- https://www.steampoweredfamily.com/activities/heart-model-heart-stem/
- https://www.youtube.com/watch?v=WufDTu_LpV0&ab_channel=PakScienceClub