## Module 8: STEAM Application Examples Made on the Farm

## Lesson Plan 1

BARNLAND

**Proposed Students Age Range: 8-12**

| Purpose / Learning Objective |
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| * Students will be able to be able to recognize the engineering principles behind structures. * Students will be able to build structures with Lego WeDo * Students will be able to make moves according to algorithm * Students will be able to understand the food preservation techniques |
| Intersecting objectives |
| * Students will be able to learn about food science and technology and their application in agriculture. * Students will be able to investigate food preservation techniques * Students will be able to discover specific technology that makes jobs faster and easier |
| Facilitation |
| * The teacher will teach simple algorithms by using games ( frog game :   https://data.bangtech.com/algorithm/switch\_frogs\_to\_the\_opposite\_side.htm   * Lego WeDo |
| Ideas for follow-up |
| Students will play the frog game to learn how they can make simple moves by using an algorithm. They will build a Lego set to feed the animals and they will learn how a Lego engine works and how to use it. |
| Resources required |
| * Computer, laptop, tablet * LegoWeDo 2.0 or spike |
| Source / The day of the lesson: Materials & Class preparation |
| https://data.bangtech.com/algorithm/switch\_frogs\_to\_the\_opposite\_side.htm  Click on the frogs to swap the three frogs on the left and the three frogs on the right.  In the lower right corner, click on Restart.  https://education.lego.com/en-gb/  <https://education.lego.com/tr-tr/downloads/retiredproducts/wedo-2/software/> |

| Implementation |
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| Timing | Instructions step by step |
| --- | --- |
| 10 min | Pre-activity:  Ask students what they remember about farms, animals, and their housing systems. |
| 10 min | Screen the pictures about animals, and their housing systems.   * Facilitate discussion with students about animal feeding systems. How do they feed themselves? Who feeds them?   -Teacher screens the cow photos, and asks questions about its needs? ( what do they eat? How do they feed themselves ? Who gives them food? Where do they live? ) Students discuss the feeding methods with the teacher. |
| 30 min | * Teach the students what a Lego brick is and how to build models. * The teacher gives the students the lego set and has them make a barn and a tool or a vehicle. * Divide the students into groups and first have them sketch their models and then give them the Lego pricks, and help them to build their simple models. |
| 40 min | * Make the students understand the simplest way of programming. * Show the students how to connect the barn to the computer. |

| Hands on activity / farm - based learning |
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| Timing | Description of activity |
| --- | --- |
| 80 min. | LEGO Farm-Based Learning Activity  Objective:  To educate children about farming, farm animals, crop cultivation, and the farm-to-table process using LEGOs.  Age Group:  Suitable for children aged 8-12 years.  Materials Needed:   * A variety of LEGOs (different sizes and colors) * Baseplates for building * Mini figures (to represent farmers and workers) * LEGO animals (if available, such as cows, chickens, horses) * Green LEGO pieces for crops * Blue LEGO pieces for water features   Activity Setup:   1. Introduction (10 minutes):   -Begin by discussing what a farm is and what it includes, such as animals, crops, and buildings.  -Explain the importance of farms in providing food and resources.   1. Building the Farm (30 minutes):   -Divide the children into small groups and assign each group a part of the farm to build. This can include animal barns and enclosures  -Provide guidance and help as needed to ensure each group can execute their ideas.   1. Role Play (15 minutes):   -Once the farm is built, allow the children to use mini figures to role play farm activities. This could include:   * + - Feeding the animals     - Driving a tractor (if available in LEGO form)   -Discuss each role and its importance to the farm's operation.   1. Educational Discussion (10 minutes):   -Gather the children and discuss what they built and learned.  -Talk about how farms work, the importance of each part of the farm, and how food gets from the farm to their tables.   1. Cleanup (5 minutes):   -Help the children to carefully dismantle their creations and sort the LEGOs back into their containers.  Learning Outcomes:   * Understanding the basics of farming and agriculture. * Development of spatial awareness and motor skills through building. * Enhancement of teamwork and communication skills.   Extension Activities:   * Visit a real farm to see the concepts in action. * Create a farm diary or story using the LEGO farm as a setting.   This activity not only teaches about farming but also encourages creativity and teamwork among children. Enjoy your educational LEGO adventure! |

## Module 8: STEAM Application Examples Made on the Farm

## Lesson Plan 2

FRUITLAND

**Proposed Students Age Range: 8-12**

| Purpose / Learning Objective |
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| * Students will be able to build structures with Lego WeDo * Students will be able to make moves according to the algorithm * Students will be able to understand the food preservation techniques |
| Intersecting objectives |
| * Students will be able to learn about food science and technology and their application in agriculture. * Students will be able to investigate food preservation techniques * Students will be able to discover specific technology that makes jobs faster and easier |
| Facilitation |
| Teacher enters the classroom with a jar of jam and asks the students what it is, why do we need to make jam?What kind of preservation technique is it? Students discuss the techniques with the teacher. |
| Ideas for follow-up |
| Students will make a list of preservation techniques of food. Cold storage, canning, fermentation, pickle |
| Resources required |
| * Computer, laptop, tablet * LegoWeDo 2.0 * Materials :a jar of jam * Videos on youtube |
| Source / The day of the lesson: Materials & Class preparation |
| <https://education.lego.com/tr-tr/downloads/retiredproducts/wedo-2/software/>  <https://www.youtube.com/watch?v=foT78hzZbXU>  <https://www.youtube.com/watch?v=-gRisxyou2Y> |

| Implementation |
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| Timing | Instructions step by step |
| --- | --- |
| 10 min | Pre-activity:  Ask students what they remember about the trip to the farm. Talk about the fruit they saw. |
| 10 min | Screen the pictures and videos taken on the farm.   * Facilitate discussion with students about fruit preservation systems. How do fruit grow? How the farmers preserve fruit? |
| 30 min | * Teach the students what is a Lego brick, a smarthub, programming and how to build models. * Ask the student to share their ideas about building a food preservation structure with Lego bricks. * Divide the students into groups and first have them sketch their own models and then give them the Lego pricks, help them to build their own simple models. |
| 40 min | * Make the students understand the simplest way of programming. * Show the students how to connect the smart hub to the computer * Press the button |

| Hands on activity / farm - based learning |
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| Timing | Description of activity |
| --- | --- |
| 80 min. | Building a LEGO Food Preservation System  Objective: Students will create a LEGO model that simulates a food preservation process using LEGO WeDo kits. They will program their models to demonstrate how technology can aid in extending the shelf life of food.  Materials Needed:   * LEGO WeDo 2.0 or SPIKE kits * Computers or tablets with LEGO programming software installed * Various LEGO pieces for constructing the model   Activity Setup:   1. Introduction to Food Preservation (10 minutes):   -Begin with a brief explanation of different food preservation techniques such as refrigeration, drying, canning, and vacuum sealing.  -Discuss how automation and technology can enhance these processes.   1. Design and Build (30 minutes):   -Challenge students to design a LEGO model that represents one of the food preservation techniques discussed. For example:   * + - Refrigeration Unit: Students build a small structure that represents a cooling system.     - Drying System: Create a model that simulates a food dehydrator.     - Canning Line: Assemble a conveyor belt system for canning fruits or vegetables.   -Encourage creativity and problem-solving as they consider how to use motors and sensors to automate the process.   1. Programming the Models (20 minutes):   -Teach students to program their models using the LEGO WeDo software. They might program a motor to simulate the operation of a conveyor belt in a canning system or sensors to detect when a "fruit" is properly "dried."  -Introduce basic programming concepts such as loops and conditionals to help automate their models.   1. Testing and Optimization (10 minutes):   -Allow students to test their models, observe how well they simulate the preservation process, and make any necessary adjustments.  -Discuss why certain designs or programs are more effective than others.   1. Presentation and Discussion (10 minutes):   -Have each group present their model to the class, explaining the food preservation technique it represents and how their program works.  -Discuss how these technologies impact food safety, quality, and shelf life.  Learning Outcomes:   * Understanding the practical applications of food preservation technologies. * Enhanced skills in building and programming with LEGO WeDo. * Improved problem-solving and critical thinking skills.   This activity not only reinforces the STEAM concepts but also gives students a practical insight into how technologies are applied in agriculture and food production, making it a comprehensive learning experience. |