



Using farms as an ecological and pedagogical education
environment- Gamified-STEAM based learning approach.

Model
{SCHOOL TO FARM}

SCHOOL TO FARM PROJECT PRACTICE EXAMPLES

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SAMPLE TRAINING MODULE 1	
Overall, this STEAM-based education program with agricultural applications for science teachers provides students with a unique opportunity to develop knowledge and competencies in both STEAM and sustainable agriculture. By providing a comprehensive understanding of sustainable agriculture and its relationship to STEAM education, this program prepares students for future careers in the growing field of sustainable agriculture.	
Title	Sustainable Agriculture
Level	Middle school (6th-8th)
Guided Learning Hours (GLH)	8 weeks (1 lesson per week)
Overall, this STEAM-based education program with agricultural applications for science teachers provides students with a unique opportunity to develop knowledge and competencies in both STEAM and sustainable agriculture. By providing a comprehensive understanding of sustainable agriculture and its relationship to STEAM education, this program prepares students for future careers in the growing field of sustainable agriculture.	
Lessons	Activities
Lesson 1: Introduction to Sustainable Agriculture Objective: Students will be introduced to the concept of sustainable agriculture and learn about the environmental and social benefits of sustainable farming practices.	<ol style="list-style-type: none"> 1. Watch a video about sustainable agriculture and discuss its benefits. 2. Research and discuss different sustainable farming practices (e.g., crop rotation, integrated pest management, cover crops). 3. Analyze case studies of sustainable farming practices and their impact on the environment and community.
Lesson 2: The Science of Soil Objective: Students will learn about the importance of soil in agriculture and the science behind soil composition and structure.	<ol style="list-style-type: none"> 1. Investigate different soil types and their properties. 2. Analyze soil samples to determine pH, texture, and nutrient content. 3. Discuss the impact of soil health on crop growth and sustainability.



Lesson 3: Plant Biology and Genetics
Objective: Students will learn about plant biology and genetics and their application in agriculture.

1. Discuss plant anatomy and physiology.
2. Explore plant genetics and the use of genetically modified crops in agriculture.
3. Conduct an experiment on the effects of different growing conditions on plant growth.



<p>Lesson 4: Agricultural Engineering Objective: Students will learn about the engineering principles behind agricultural equipment and structures.</p>	<ol style="list-style-type: none"> 1. Research and discuss different types of agricultural equipment (e.g., tractors, irrigation systems). 2. Analyze the design and construction of agricultural buildings and structures (e.g., barns, greenhouses). 3. Design and build a model of an agricultural structure or equipment.
<p>Lesson 5: Water Conservation in Agriculture Objective: Students will learn about the importance of water conservation in agriculture and the methods used to conserve water.</p>	<ol style="list-style-type: none"> 1. Investigate the water cycle and its relationship to agriculture. 2. Discuss the impact of drought on agriculture and the need for water conservation. 3. Research and discuss different water conservation methods used in agriculture (e.g., drip irrigation, rainwater harvesting).
<p>Lesson 6: Food Science and Technology Objective: Students will learn about food science and technology and their application in agriculture.</p>	<ol style="list-style-type: none"> 1. Discuss the chemistry of food and its nutritional value. 2. Investigate food preservation techniques used in agriculture (e.g., canning, freezing). 3. Conduct an experiment on the effects of different food preservation methods on food quality and safety.



Lesson 7: Marketing and Business in Agriculture Objective: Students will learn about the marketing and business aspects of agriculture.

1. Research and discuss different agricultural business models (e.g., farm-to-table, community-supported agriculture).
2. Analyze case studies of successful agricultural businesses and their marketing strategies.
3. Develop a marketing plan for a sustainable agricultural product.



<p>Lesson 8: Sustainable Agriculture Project Objective: Students will apply the knowledge and skills they have learned throughout the program to develop a sustainable agriculture project.</p>	<ol style="list-style-type: none"> 1. Identify a local or global agricultural issue to address. 2. Develop a project proposal that incorporates sustainable farming practices and STEAM principles. 3. Implement and evaluate the project.
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This program provides a comprehensive and engaging introduction to sustainable agriculture and its relationship to STEM education. It can be adapted and modified to fit the specific needs and interests of different classrooms and student populations.

SAMPLE TRAINING MODULE 2	
<p>This program provides a comprehensive and engaging introduction to sustainable agriculture and its relationship to STEM education. It can be adapted and modified to fit the specific needs and interests of different classrooms and student populations.</p>	
<p>We prepare an agriculture-based STEAM training program for teachers. The following program examples aim to provide teachers with knowledge and practice on agriculture and STEM topics:</p>	
<p>Competence Area:</p>	
<ul style="list-style-type: none"> • To understand and evaluate the economic, environmental, social and cultural importance of agriculture • Promotion of local agricultural products and understanding their importance • Sustainability of agricultural processes and environmental 	
Topics	Explanation
<p>1. Soil Science</p>	<p>Soil science is one of the basic components of agriculture and has a strong connection with STEM fields. In this program, teachers will learn about soil composition, texture, moisture content and pH level. In addition, they will be able to increase their awareness of soil health and fertility by analyzing soil samples with the students.</p>





<p>2. Plant Biology</p>	<p>In this program, teachers will learn about the structures, growth processes and metabolisms of plants. In addition, they will be able to increase their awareness of plant health and productivity by examining basic biological processes such as photosynthesis, respiration and transpiration of plants together with students.</p>
<p>3. Agricultural Technology</p>	<p>In this program, teachers will learn about agricultural technology. These technologies can include farm machinery, automatic irrigation systems and greenhouse technologies. Teachers, together with students, will be able to develop technologies suitable for sustainable agriculture by examining the design, function and effects of agricultural technologies.</p>
<p>4. Food Science</p>	<p>Food science is a broad field ranging from agriculture to the table and has a close connection with STEM fields. In this program, teachers will learn about food production, processing, storage and distribution. In addition, they will be able to increase their awareness of healthy and sustainable food systems by examining the chemical components, nutritional values and health effects of foods together with the students.</p>
<p>5. Agricultural Marketing</p>	<p>Agricultural marketing includes developing strategies for the sale and distribution of agricultural products and is closely linked to STEM fields. In this program, teachers will learn about agricultural marketing strategies, e-commerce, direct selling and customer service. also</p>



6. Importance of agriculture	It is aimed that students who understand the importance of agriculture and how the agricultural sector works.
7. STEM subjects	With agriculture-based STEAM projects, it is aimed for students to better understand and learn about STEM subjects.
8. Environmental awareness	It is aimed to increase the awareness of the students about the effects of agriculture on the environment and the sustainability of agriculture.
9. Culture and history:	By drawing attention to the cultural and historical importance of agriculture, it is aimed that students understand how agriculture has developed throughout history and how it has affected cultures.
10. Local agriculture:	By emphasizing the importance of local agriculture, it is aimed that students learn about local agricultural products and how they grow these products.



11. Collaboration and leadership	In agriculture-based STEAM projects, it is aimed that students come together to collaborate and develop leadership skills.
If farmers are involved in STEAM training, what they can teach teachers can be added to the program. Below is some information that farmers can pass on to teachers	



FARMERS COMPETENCE TRAINING MODEL	
Topics	Explanation
1. Agricultural Practices	Farmers can give practical information to teachers about the management of agricultural activities, tillage, plant growing, and harvesting processes. Students can learn how to deal with real-world problems by examining farmers' practices.
2. Soil Analysis	Farmers can inform teachers about analyzing soil samples. These analyses help determine soil structure, pH, texture, and nutrient content. This knowledge can increase students' awareness of soil health for sustainable agriculture.
3. Plant Protection	Farmers can inform teachers about various plant protection methods. These methods may include the control of pests and diseases, the use of natural enemies, and chemical interventions. Using this information, students can examine the effects of various plant protection methods.
4. Agricultural Technology	Farmers can inform teachers about agricultural technology and mechanization. These topics may include tractors, irrigation systems and fertilizing machinery. By studying the design and construction of agricultural equipment, students can develop equipment suitable for sustainable agriculture.



5. Agricultural Marketing	Farmers can inform teachers about agricultural marketing strategies and business models. These topics may include farming, direct selling and internet marketing to the local market. Students can develop appropriate marketing strategies for sustainable agriculture by examining the marketing methods of farmers.
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TEACHERS AND FARMERS FARM BASED STEAM EDUCATION MODEL	
Course Title	Agriculture and Technology
Course Description : This course allows students to understand the relationship between agriculture and technology and to design technologies used in agriculture using STEAM principles.	
Lesson Plan	
Topics	Procedure
Part 1: The Relationship Between Agriculture and Technology	<ul style="list-style-type: none"> • Explain how agriculture and technology interact. • discuss the advantages and disadvantages of using technology in agriculture. • give examples of the use of innovative technologies in the agricultural sector.
Part 2: Hydroponic Gardening	<ul style="list-style-type: none"> • Explain what hydroponic gardening is and how it works. • discuss the advantages and disadvantages of using hydroponic horticulture in agriculture. • Provide students with instructions for designing and building a system for hydroponic gardening..
Part 3: Robotic Farming	<ul style="list-style-type: none"> • Explain what robotic farming is and how it works. • To discuss the advantages and disadvantages of using robotic agriculture in the agricultural sector. • Provide students with instructions for designing and building a prototype for robotic farming.



Part 4: Modeling Sustainable Agriculture	<ul style="list-style-type: none"> • Explain what sustainable agriculture is and why it is important. • To provide students with tools to design sustainable agriculture models. • To enable students to design sustainable agriculture models and analyze their results.
Part 5: Project Presentations	<ul style="list-style-type: none"> • To allow students to make presentations about their own hydroponic garden systems, robotic farming designs and sustainable farming models. • Ensure presentations focus on the relationship between agriculture and technology.





This syllabus will help students understand how agriculture and technology interact and design agricultural technologies using STEAM principles.

1. Agricultural technology and engineering
2. Plant growing and harvesting techniques
3. Animal breeding, feeding and care
4. Food production, processing and storage
5. Sustainable agriculture and environmental management
6. STEAM jobs in the agriculture and food industry
7. Application of STEAM skills to agricultural applications (eg data analysis, modeling, coding)
8. Example STEAM projects and applications (e.g. robotic farming, hydroponic gardening, sustainable farming modeling)
9. Evaluation of students' STEAM skills.

STEAM is an approach that includes the concepts of science (Technology), engineering (Engineering), arts (Arts) and mathematics (Mathematics). This program will enable students to learn about greenhouse-grown plants and engage them in STEAM topics.



STEAM-BASED GREENHOUSE TRAINING PROGRAM	
Title	Sub-topics
1. Science	<ul style="list-style-type: none"> • Basic needs of plants (water, sun, soil) • Growth stages of plants • Photosynthesis of plants
2. Technology	<ul style="list-style-type: none"> • Structure and function of the greenhouse • Irrigation and fertilization systems • Automation systems
3. Engineering	<ul style="list-style-type: none"> • Design and construction of the greenhouse • Energy saving of the greenhouse • Design of irrigation and fertilization systems
4. Arts	<ul style="list-style-type: none"> • Aesthetic properties of plants • Artistic use of greenhouse-grown plants • Different colors and textures of plants.
5. Mathematics	<ul style="list-style-type: none"> • Growth rate and productivity of plants • Calculations of soil and irrigation systems • Calculation of harvest efficiency

This program gives students the opportunity to understand and evaluate greenhouse-grown plants using STEAM topics. Students can focus on science and engineering topics to understand the physical and chemical properties of the environment in which plants grow. They can explore the subject of technology by learning how the technological systems of the greenhouse work. Art and math topics can help them understand the aesthetic properties and productivity of plants. In addition, students can develop environmentally friendly and sustainable practices in greenhouses using STEAM topics.