BURSA İNOVASYON MERKEZİ

STEM ve YAPAY ZEKA TEMA: SÜRDÜRÜLEBİLİR TARIM PROGRAMI

STEM ETKİNLİK PLAN ŞABLONU

Team Name:	Synergy
Teachers' Names:	Şehvan Yoldaş, Sabiha Obay, Şenay Uçar, Merve Karslı
Topic Title:	Modeling and Designing a Vertical Farming Unit Inspired by DNA
Learning Objectives / Goals:	The main objective of this study is to develop a vertical farming unit inspired by the spiral structure of DNA that includes automation systems (automatic irrigation and fertilization). The project aims to increase agricultural productivity through innovative vertical farming approaches while considering practicality and economic aspects of the system.
Related Learning Outcomes:	Science: Students explore biotechnology concepts related to DNA and genetic code and predict possible future applications of genetic engineering.
	Information Technologies: Students learn to use visual processing programs, recognize image file formats, and perform image editing operations.
	Engineering: Students obtain appropriate materials, select tools, create a work schedule, calculate costs and evaluate the design process. They prepare sketches and multimedia presentations for their design ideas.
	Mathematics: Students analyze data and represent them using column, pie and line graphs and convert between these representations.
	Other – Turkish Language: Students interpret information presented through graphs, tables and charts.
Grade Level:	Middle School Grades 7 and 8
Duration:	10 Class Hours
21st Century Skills:	Collaboration, Creativity, Imagination, Systemic and Critical Thinking, Technology Literacy, Financial Literacy, Science and Mathematics Literacy, Problem Solving Skills, Strategic Thinking Skills, Communication Skills, Analytical Thinking Skills, Collaborative Work Skills
Learning Approach:	Project-Based Learning, Design-Based Learning, Problem-Based Learning, STEM
Tasks (Teacher and Student Roles):	Teacher (guide); Students (research, presentation, design and model creation)
Materials / Technologies:	Tinkercad, 3D printer, DNA model, cotton seed germination container, seeds (beans, lettuce, strawberry, basil)
LESSON PLAN ACCORDING TO THE 5E LEARNING MODEL	Teacher enters the class with a DNA model and a germinated bean seed in cotton and asks students what they can say about the materials. Students' responses are discussed and written on the board.
	Students research vertical farming and hydroponics, visit greenhouses or hydroponic production areas, and conduct seed germination experiments in different environments.
	Students present findings from their visits and experiments and share collected data with classmates.
	Students design a DNA-inspired vertical farming system, model it using Tinkercad, print a prototype with a 3D printer, assemble the system and plant seeds.
	Evaluation is conducted using a rubric tool.
Related Resources:	Ministry of Education Science textbook
References:	Sources on vertical farming including Wikipedia, Auxgrow, Turkish Agriculture Ministry publications and resources on soilless agriculture.