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STEM AND AI THEME: SUSTAINABLE AGRICULTURE

STEM ACTIVITY PLAN

Country:	Turkey
Teachers' Names:	Harun Akkaya Berna Özger Atilla Hakan Ufuklar Ahmet Bınarcı
Subject Title:	Creating A Road Map For The Protection Of Fruit Trees From Diseases And Healthy Development
Learning Objectives/Goal:	Recognises fruit trees Knows tree diseases Knows what to do about tree diseases Knows what affects trees against external factors. Learns the works to be done to protect trees against external factors affecting them. Determines the engineering works to be done to protect the trees. Knows artificial intelligence studies to be done to protect trees. Gains the necessary skills to assess the general health of a tree and identify problems. Creates a plan by determining the appropriate methods of struggle according to the detected problems Learn about the technologies and applications used to remotely monitor tree health. Learn about the spread of diseases and epidemics and take preventive measures Learns environmentally sensitive and sustainable tree growing practices Learns the importance of regular maintenance operations such as irrigation, fertilisation, pruning and correct application methods Apply cultural control methods such as cleaning of diseased plant residues, crop rotation, preference of resistant varieties. Learns biological control methods using beneficial insects, parasites and microorganisms against pests. Gains knowledge on the correct and safe use of chemical pesticides when necessary. Use artificial intelligence to diagnose diseases and pests through visual symptoms (leaf yellowing, decay, insect holes, etc.) and other symptoms (odour, stickiness). Knows how to use artificial intelligence to take samples and perform laboratory analyses to identify disease agents when necessary. Gains basic knowledge about the structural characteristics of trees, their growth processes and their response to environmental factors. Learns the symptoms, causes and transmission routes of common tree diseases (fungal, bacterial, viral). Recognise the types and effects of insects, rodents and other organisms that damage trees. Understands the effects of environmental factors such as soil structure, irrigation, climatic conditions on tree health.

Related Outcomes:	**Science:** Compare the types of reproduction in plants and animals. Explains growth and development processes in plants and animals by giving examples. Explains the basic factors affecting growth and development in plants and animals.
	Information Technologies: Designs a robotic circuit using online simulation tools. Places software components suitable for the project design in a block-based environment. Recognise the importance of big data in artificial intelligence applications. Recognises the importance of data mining concept in artificial intelligence applications. Recognise methods of using productive artificial intelligence applications effectively Explains the sub-dimensions of artificial intelligence. Associates the sub-dimensions of artificial intelligence and usage areas Explains the results of different artificial intelligence applications through examples. Selects the fastest and most accurate solution by analysing different algorithms. Explains the functions of a programme presented in a block-based programming tool. Creates programmes containing linear logic structure. Test and debug programmes containing linear logic structure. Construct programmes containing decision structure. Test and debug programmes containing decision structures. Creates programmes containing multiple decision structures. Creates programmes containing loop structure. Debugs by testing programmes containing loop structure. Selects the most appropriate decision structures to adapt an algorithm.
	Engineering: Makes draft drawings for design. Converts draft drawings into visuals with the help of artificial intelligence. Evaluates the application of sensor technology in daily life. Gives examples of the use of technological tools connected to the Internet in daily life. Designs a product that can be used in accordance with the concept of smart product. (develops an innovative idea that will make human life easier). Evaluates the designed product. Makes a model or prototype of the designed product,
	Math: Decides whether two multiplicities are proportional or not by analysing real life situations. Expresses the relationship between two directly proportional multiplicities. Determines and interprets the proportional multiplicity of two proportional multiplicities
	Other: Takes part in the group. Shares his/her own ideas. Presents the product effectively. Evaluates algorithms that can solve the same problem.

Grade:	7th and 8th Grades
Duration:	90 + 90 minutes
21st Century Skills:	Communication and Co-operation Technology and Media Literacy Creativity and Innovation Learning Skills Personal Development
Learning Approach:	Project based learning Collaborative learning Active learning Inventive learning
Duties (Student and Teacher roles):	The teacher acts as a guide and directs the students by asking them questions. Students, on the other hand, play the role of researchers, question the subject and its effects and produce their projects by developing solution suggestions.
Materials and Technologies to use:	Smart Sensors Connection elements (cable etc.) Artificial Intelligence Applications. It uses a micro control unit (Arduino, Rasperry, Paper Pencil Other materials needed by the students.
Lesson Plan According to 5E Learning Model	**Engage-Enter - Duration: 20** The teacher enters the classroom with shelled walnuts and almonds. He asks the students what they have in their hands. After the answers, he/she tells what he/she has. Then he tells the students to produce an orchard picture in the artificial intelligence application. After the pictures produced, he/she offers walnuts and almonds to each group. Some of the walnuts and almonds served are blackened and some are wormy. When the students break the walnuts and almonds, they see that some of them are diseased. The teacher asks why the differences between the walnuts and almonds grown in the same garden?
	Exploring - Duration: 20 They question why some of their friends have good walnuts/almonds while others have bad ones. Identifies the diseases of the related plants by using artificial intelligence tools and reaches information about the solution of these diseases. Discusses the process for healthy growth of fruit trees. Learns external factors and gets support from artificial intelligence in this regard.
	Explain-Time 40 The teacher identifies the missing learning by creating a mind map on the board with the help of brainstorming to identify students' deficiencies from the discovery process. It is ensured that the relevant acquisitions are acquired.
	Elaboration-Duration 80

	All students are expected to draw draft drawings of their projects. Students are guided in the form of small group discussions to eliminate the problems identified with each group. It is checked whether the different ideas developed by the students are compatible with the process of acquiring knowledge and the draft drawings are developed by asking encouraging questions so that the students can develop their ideas. After the small group discussion, the students proceed to the prototype production of the matured projects. (Institutions that do not have a physical product can produce the 3D design in the tinkercad program and produce it using sensors in the Circuits section. Institutions with 3D printers print and design on it). During the production process, products that are not on the list that students need are provided. Students who want can proceed through the visuals by having their product design pictures produced by artificial intelligence.
	Evaluation-Time 20 Students are allowed to evaluate themselves and the group work by using the group evaluation (Annex 2) and individual evaluation (Annex 1) lists. Teachers use the rubric form (Annex 3) to evaluate group and individual work.
Related Resources:	Artificial intelligence applications Tinkercad MBlock Youtube Eba Vitamin General network search Web pages of various provincial directorates of the Ministry of Agriculture. Web pages of Fertiliser Companies
References:	Gemini EduApp Canva Tinkercad

Images of Project Example

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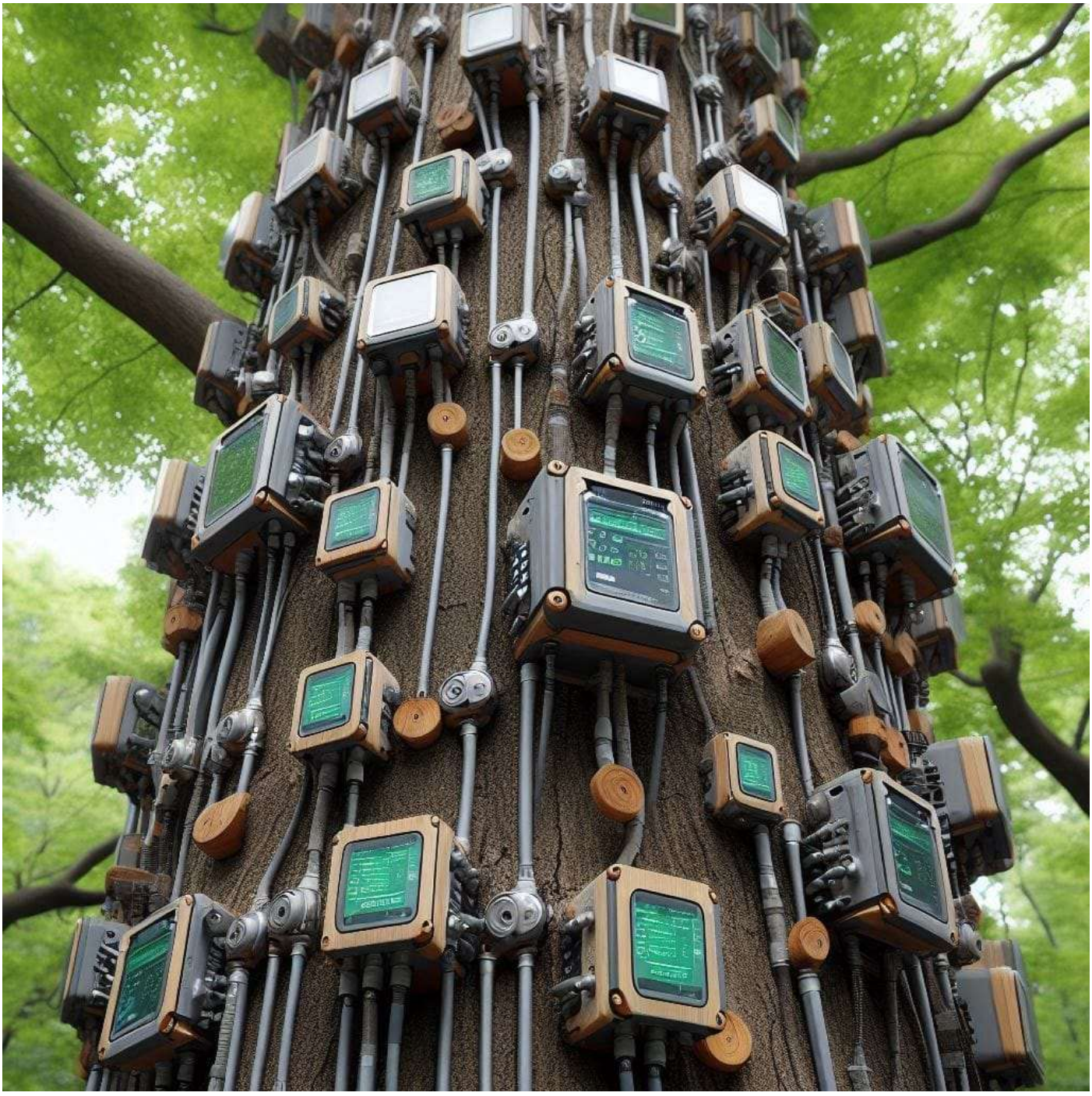

Forms to be used in the evaluation.

APPENDIX1

Name, Surname:..... Date.....

GROUP EVALUATION

Group Name: .....

Activity Name: .....

How did your group do the activity?

Read the following questions and mark the score you think your group deserves.

	High	Medium	Low
1. How adequate was your plan for this activity?	3	2	1
2. Did the members of your group listen to each other's thoughts?	3	2	1
3. Is the work to be done in your group shared fairly?	3	2	1
4. Did your group use the tools carefully?	3	2	1
5. Did your group record the information correctly?	3	2	1
6. How competent was your group in solving problems without the help of the teacher?	3	2	1
7. How was the cleanliness and organisation of your group?	3	2	1
8. How helpful and respectful were the members of your group?	3	2	1
9. How was the success of your group in implementing the activity plan?	3	2	1
10. How creative were the ideas put forward by your group?	3	2	1

After reviewing your answers to the questions above, answer the following questions.

11. What did your band achieve best?

.....
.....
.....
.....

12. What can you do to make your group more successful?

.....
.....
.....
.....

APPENDIX2

Name, Surname:.....Date.....
Activity Evaluation:.....

Individual Assessment

What I learnt at this event:

What are the parts of this activity that I enjoyed the most and what are the parts of this activity that I had difficulty with?

If I were to do this activity again, what would I do differently, where and how will I use what I learnt in this activity?

APPENDIX3 – Teacher Evaluation Criteria

Category	4	3	2	1	Score
Idea development	Existing known model and knowledge inside the product it is clear that it is taken into account	The idea in the product is clear and in an easy way understandable.	Some in the idea in the product points are not clear and need explanation hears	Known models did not take into account	….
Knowledge-Based Life Problem relationship	Desired criteria emphasised and detailed information is given. Also some points higher than expected, deepening provided	Desired criteria emphasised and detailed information given	Desired criteria emphasised, but the information used is limited	All emphasised limitations not taken into account	….

Material usage	Materials provided in the right way used Small creative adaptations authenticity of the product with augmented	Materials provided in the right way used	Materials provided incomplete and sloppy used in such a way	Given materials product to create will not be enough extremely limited used	**....**
Authenticity	The product is completely original thought and creative idea Showing Personal touches.	Product some original ideas and different perspectives angles revealed It's putting it in.	The product conforms to the instructions despite the fact that results of the he couldn't put it in.	The product is not original, information provided repeated, sloppy	**....**
Presentation	Promotion of the product all in detail is being done, the listener participation is ensured.	Careful product presentation and understandable in the way it is done.	Careful product presentation but some points not understandable.	Product promotion sloppy, understandable It isn't.	
Total Score(20)					**....**