

## **PEDAGOGICAL APPROACH OF TÜRKİYE’S SCIENCE CURRICULUM<sup>iii</sup>**

### **“Science, Engineering and Entrepreneurship Applications**

The purpose of science is to develop logical and systematic explanations of natural phenomena, to create theories, and to discover principles and concepts. By transferring scientific processes to learning environments, the aim is to enable students to conduct research and directly participate in the scientific process to understand how scientific knowledge is developed. Engineering involves systematic and open-ended applications to design objects, processes, and systems that meet human desires and needs. Technology, on the other hand, is the modification of the natural world to fulfill human needs and desires. The goal of related practices is to help students establish the connection between engineering and science, understand interdisciplinary interactions, and develop their worldview by making their learning experiential. It is important for students to experience science and engineering applications to enhance our country's scientific research and technological development capacity, socio-economic progress, and competitive power.

In the curriculum, within the scope of Science, Engineering, and Entrepreneurship Applications, students are first expected to identify a need or problem from daily life related to the topics covered in the units. The problem should be oriented towards developing tools, objects, or systems used or encountered in daily life. Furthermore, problems should be addressed within the criteria of material, time, and cost.

In solving the problem, students compare alternative solutions and select the appropriate one based on criteria. They are expected to plan and present the product in the next stage. The design and production process of the product takes place within the school environment. Students are expected to conduct experiments during the product development stage, record qualitative and quantitative data and observations from these experiments, and evaluate them using their skills in reading or creating graphs.

To develop entrepreneurial skills, students are asked to create strategies to market the product and use promotional tools. For example, students can prepare newspaper, internet, or television advertisements for promotional purposes or create short films.

### **Special Issues in Science Teaching**

In the Science Curriculum, an interdisciplinary perspective has been adopted based on a research-inquiry learning approach.

### *Teacher-Student Roles*

In the Science Curriculum, a holistic perspective is embraced in terms of learning-teaching theories and practices. Generally, students are responsible for their own learning, actively participate in the learning process, and employ a learning strategy based on research-inquiry and knowledge transfer. In the learning-teaching process, the teacher assumes a facilitative and guiding role, while the student takes on the role of an individual who investigates, questions, explains, discusses, and transforms knowledge. In this process, the integration of science with mathematics, technology, and engineering aims to enable students to approach problems from an interdisciplinary perspective. In this context, the role of teachers is to guide students in integrating science, technology, engineering, and mathematics, and to elevate students to a level where they can engage in higher-order thinking, product development, invention, and innovation.

Creating a democratic classroom atmosphere where students can freely express their views and contribute to the development of their critical thinking and communication skills is important. The teacher serves as a guide who shares the value, importance, and excitement of scientific knowledge with students, while also directing the research process in the classroom. The teacher encourages students to develop a spirit of inquiry and scientific thinking and ensures the adoption of universal moral values, national and cultural values, and ethical principles in practical applications. Students collaborate and communicate effectively with their peers while researching and questioning knowledge. Facilitating such collaboration in the evaluation of learning outcomes will contribute to the achievement of the curriculum's objectives.

### *Adopted Strategies and Methods*

The Science Curriculum emphasizes conducting lessons in student-centered learning environments (such as problem-based learning, project-based learning, argumentation, and collaboration). Classroom and out-of-school learning environments are designed according to the research-inquiry learning strategy to enable students to learn knowledge in a meaningful and enduring way. Informal learning environments (such as school gardens, science centers, museums, planetariums, zoos, botanical gardens, natural environments, etc.) are also utilized. It is recommended that students carry out project design, model and product development, and product promotion performances as much as possible in the classroom under the guidance of the teacher. Activities are expected to be carried out collaboratively with peers within the school atmosphere.

The learning process encompasses exploration, inquiry, argumentation, and product design. Moreover, opportunities for students to express themselves in written, oral, and visual forms and develop communication and creative thinking skills are provided. Environments where students can discuss the benefits and drawbacks related to scientific facts, supporting their thoughts with different reasons and developing counterarguments to refute their peers' claims, should be created. Teachers play a guiding role in discussions where students present their claims based on valid evidence.

The Science curriculum values the application of science and its contribution to the economy. In this context, each unit and topic adopts an approach that aims to produce technologies that meet daily life needs. When the achievement "F.7.3.3.3. Designs a tool to reduce air or water resistance" is realized, the effects of frictional force on daily life will become clear in students' minds. This clarification will lead to an awareness of the impact of friction on objects in different environments, activating students' potential to take initiatives and create means of livelihood in these areas. Therefore, the process of acquiring scientific knowledge and skills in the field of science and the production of technological products serve entrepreneurship competency, contribute to adding value to life, developing material culture, and serving the economic life. Within this framework, the integration of science and entrepreneurship is included as an integral part of the Science and Entrepreneurship course, parallel to each unit and inherent in each learning outcome. As a result, guided by their teachers, students will integrate scientific knowledge with engineering.”

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<sup>i</sup> This text was translated from the Science (Gr. 3-8) curriculum of the Turkish Ministry of National Education (2023, p. 9-11): <http://mufredat.meb.gov.tr/Programlar.aspx>

<sup>ii</sup> ChatGPT was used for translation and then the text was edited: OpenAI. (2023). ChatGPT (May 24 version). <https://chat.openai.com>