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Organizing Integrated Lessons Based on the Steam Approach

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Abstract: This article provides a brief overview of STEAM disciplines and the components of models, and considers modeling and models as tools for implementing STEAM learning. Also, the integrated education of fundamental sciences and engineering sciences was thoroughly thought about.

Key words: integration, integrated education, model component, modeling, fundamental sciences, STEAM, STEAM sciences, STEAM education.

Steam Yondashuvi Asosida Integratsiyalashgan Darslarni Tashkil Etish

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«"Ijtimoiy -gumanitar fanlar» kafedrasi katta ukituvchisi
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Annotatsiya: Ushbu maqolada STEAM fanlari hamda modellarning komponentlari haqida qisqacha ma’lumotlar berilgan bo‘lib, modellashtirish va modellar STEAM talimni amalga oshirish vositasi deb qaralgan. Shuningdek fundamental fanlar bilan muhandislik fanlarining integratsiyalashgan talimi haqida atroflicha fikr yuritilgan.

Tayanch so‘zlar: integratsiya, integratsiyalashgan ta’lim, model komponenti, modellashtirish, fundamental fanlar, STEAM, STEAM fanlar, STEAM ta’limi.

Each of the subjects that make up the STEAM subjects is a whole subject with a separate source of knowledge. If we pay attention to the history of the origin of these sciences, we can see the emergence of another science as a result of the rapid development of one science. Due to the development of these sciences, their scientific interrelationship, and practical application, the third and fourth sciences, that is, technology science and engineering science, are created. Based on this, natural sciences and mathematics remain fundamental to the study of engineering and technological sciences. These sciences naturally show two cases: the first is mathematics, design and natural sciences
while the latter covers theoretical cases, the latter reflects cases where engineering and

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technology are practically oriented. Thus, it is important to use integrated education in explaining the interdependence of the first and second cases in the practical application of theoretical knowledge, and from the implementation of this education, education and integration of STEAM subjects occurs (Fig. 1).

Figure 1. A model of the emergence of STEAM science education and integration.

The implementation of STEAM education is based on the above two cases, through digitization, modeling and models. For example, while explaining the integration of STEAM subjects, graphs, drawings, virtual images, processes in events, and digitization of processes in STEAM subjects, models in the implementation of STEAM subjects' education represent process aspects in a simple way and range from simple conceptual sketches and complex prototypes to mathematical models. includes Models in engineering are defined mainly from a functional point of view. Modeling and solving problems from models, predicting paths leading to solutions, making the right decision when choosing different solutions, choosing convenient educational tools for solving problems, and other similar reasons make it possible to find solutions to problems.

Integrated education is based on the scientific connection of two or more subjects, and it arises from the use of another subject in learning one subject. Mathematics-physics, chemistry-mathematics, physical chemistry, biology-chemistry, etc. STEAM-approach STEAM science education is a much larger concept than integrated education, which is education based on the interdisciplinary integration of at least four subjects. We can find out through questionnaire surveys that most teachers do not want this method of education. The reason for this is simply the above-mentioned, when implementing STEAM science education, teachers are required to integrate at least two or more science integrations into the subjects of the science they teach and to know the theoretical knowledge of STEAM science.

We can mention the following 5 cases as a category that creates STEAM science education and integration.

1. Subjects of science embody an independent and ordered sequence, one topic serves to

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explain the next topic. Arrange topics so that one topic builds on another. STEAM topics are taught sequentially, one preceding the other, so that one topic complements the next. For example, a vector is taught in a math class and then used to learn this concept in a physics class to explain a topic about forces.

2. Simultaneous teaching of STEAM subjects and their subjects in parallel. Our analysis shows that subjects are placed in parallel in the curricula of the current production engineering fields, but no attention is paid to the interdependence of the content and topics of the science programs. No importance was attached to the sequence of topics and the way in which one topic helps another topic in the study of topics. The parallel placement of subjects in the curriculum is necessary to consider the sequence of subjects of science programs and to ensure their originality in order to bring good education to a new level.

3. STEAM subjects are occasionally co-taught or partially co-taught by different subject teachers to demonstrate the interconnectedness of the subjects. While STEAM subjects are sometimes taught as separate fields, sometimes teaching these subjects together to show how they are interconnected can help students understand how their unique lenses fit together.

4. Reinforcement of one subject of STEAM subjects using other subjects, where the first one has an advantage in strengthening the subjects with the help of the passed topics, and the second one has an advantage in the teaching process.

5. STEAM science education consists of the co-teaching of the full integration of more than four disciplines. In teaching, one of these subjects is not considered superior to the other.

6. In general, we can say that the process of STEAM science modeling is the first step in applying theoretical knowledge to practice. As a component of STEAM subjects, the following subjects consisting of its letters can be considered: S-natural sciences, T-technology, E-engineering, engineering, M-mathematics. Modeling and digitization are important in integrating the components of STEAM and explaining their interrelationships. We can say that models and modeling processes are one of the serious tools that reveal the integration of STEAM subjects. Depending on the model, the ways of integration of subjects are studied, and the student or teacher himself performs the process through modeling.

Just as STEAM subjects have components, models also have components, and they include:

- mental models (models with cognitive presentation);
-expressed models (models that others can interpret);
-consensus models (currently existing and used models);
-scientific models (tested and currently used models that become forecasting tools);
- historical models (models in the initial state of developed models);
- educational models (pre-existing models used in educational processes);
- teaching models (models that help to interpret historical and teaching models);
-hybrid models (models combining scientific, historical or educational models).

Implementation of the STEAM education approach is becoming the main criterion of engineering innovation activities, combining fundamental and practical knowledge, modern technologies and, most importantly, their effective use for practical purposes. As a result, a new approach to engineering education is formed [1]. Learning the components of models and being able to use them correctly is important in the implementation of STEAM science education.

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