

**METHODOLOGY FOR USING SINGAPORE'S EXPERIENCES IN TEACHING
NATURAL SCIENCES**

Sh.B.Khasanova

Navoi Innovation University

Associate Professor, Ph.D. Doctor of Philosophy (PhD)

Annotation: The article highlights the implementation of Singapore's educational experience in teaching natural sciences, particularly through the application of the 5E instructional model. This model represents a modern pedagogical approach to learning natural sciences and comprises five fundamental phases: engagement, exploration, explanation, elaboration, evaluation

Kalit so'zlar: 5E modeli, tasniflash, muloqot, xulosa qilish, gipotezani shakllantirish, bashorat qilish, tahlil qilish, imkoniyatlar yaratish.

Аннотация: В статье представлены особенности применения Сингапурского образовательного опыта в процессе преподавания естественно-научных дисциплин, в частности использование модели 5Е. Данная модель является современным педагогическим подходом к изучению естественных наук и включает пять основных этапов: вовлечение, исследование, объяснение, применение и оценивание

Ключевые слова: модель 5Е, классификация, коммуникация, формулирование выводов, выдвижение гипотез, прогнозирование, анализ, создание возможностей, вовлечение, исследование, объяснение, применение, оценивание.

Annotatsiya: Maqolada tabiiy fanlarni o'qitishda Singapur ta'lim tajribalaridan ya'ni, 5E modelidan foydalanish tajribalari havola etiladi. 5E modeli tabiiy fanlarni o'rganishda qo'llaniladigan zamonaviy yondashuv bo'lib, beshta asosiy bosqichni o'z ichiga oladi: jalb qilish, tadqiq etish, tushuntirish, qo'llash, baholash

Keywords: 5E model, classification, communication, drawing conclusions, formulating hypotheses, making predictions, analysis, creating opportunities, engagement, exploration, explanation, elaboration, evaluation.

Teaching natural sciences in general secondary schools is aimed at developing and developing the ability to apply knowledge in practice by generalizing students' life ideas and practical activities. Currently, in teaching natural sciences, attention is being paid to the formation of the ability to apply natural science knowledge in students' daily lives and to the formation of independent thinking skills. These processes will serve as the basis for achieving effective results in fulfilling the tasks of international assessment programs, PISA, TIIMS studies. In this regard, studying the educational experiences of Singapore and organizing lessons based on their teaching methodology will allow us to achieve good results. The Singaporean natural science curriculum is based on scientific research and practice and identifies three integral areas that are important for the practice of science: knowledge, understanding and application; skills and processes; values and attitudes.

The curriculum allows students to understand that the pursuit of science is meaningful and useful, because it is based on knowledge, problems and questions related to the place of science in everyday life, society and the environment

In Singapore, lessons are organized according to the 5E model.

In the context of practical work in natural sciences, the following process skills are developed.

These are:

- Problem solving through innovative thinking
- Decision making
- Research.

Natural sciences study the nature that surrounds us, that is, living and non-living objects and natural phenomena. They are the objects of research of natural sciences. The object of research answers the question "What do you want to study?"

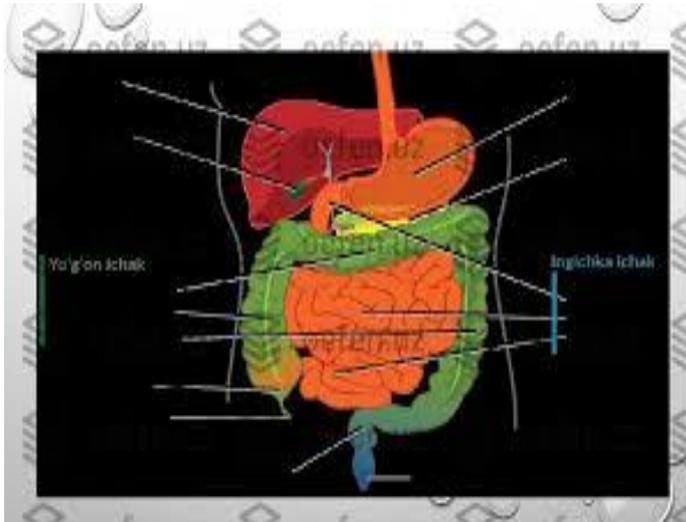
The skills developed in the lessons are:

Observation, comparison, classification, use of devices and equipment, communication, inference, hypothesis formulation, prediction, analysis, creation of possibilities, evaluation.

Using Singapore's experience in teaching natural sciences, we present the experience of organizing the topic "Human Digestive System" in grade 6 using the 5E model.

The 5E model is a modern approach used in the study of natural sciences, which includes five main stages: engagement, exploration, explanation, elaboration, and evaluation.

Stage 1. Attracting attention. At this stage, it is necessary to activate students' basic knowledge, attract their attention to the topic, interest them in studying a new topic, and encourage them to pay attention to the object, scientific phenomenon, or problem being studied. An important part of this stage is to identify students' basic knowledge and misconceptions. To implement this stage, the teacher can show students pictures, tables, graphs, models, etc. that encourage them to ask questions, or ask questions about what life experience, imagination, and understanding they have about the topic. M, What is this? Why are we learning this? Outcome of stage 1: Students' basic knowledge and misconceptions are identified; they become more enthusiastic about finding answers to questions.



1. Describe the sequence of the digestive system according to the picture.
2. What do you understand by digestion.
3. Do you know the composition of the food products you eat?
4. What foods should you eat.
5. What changes do the substances important for the body in food undergo before they reach the cells?
6. Why do we eat?

By asking these questions, we can identify the students' basic knowledge and misconceptions.

Stage 2. Research. At this stage, it is required to find answers to the above questions. This is done by working with various sources of information or by observing and conducting experiments. The teacher invites students to study scientific concepts related to the topic. Then they work in groups and pose research questions. The groups justify the scientific research method they have chosen. Each member of the group must take responsibility for achieving the goal. It is advisable for the teacher to encourage lively discussion in the group. At the research stage, it is required to draw a diagram of the digestive system sequence and study it. Students should notice the regularities in the research results, identify cause-and-effect relationships. The teacher's task is to organize the students' learning activities, provide students with the necessary materials and equipment, listen to them, ask questions and instructions, help students understand the essence of scientific concepts and develop new skills.

The result of stage 2: students discuss the research conducted and the regularities in its results. This allows each student to listen to the observations and preliminary explanations of their classmates, as well as prepare for the next stage of the lesson.

Stage 3. Explanation. The knowledge acquired by students in the stages of "Attracting attention" and "Research" is revealed at this stage. Starting this stage is very simple: the teacher asks the students to explain what they have learned and observed in the previous stages. Then he gives a definition of the scientific concepts related to the topic. The teacher should show creativity in the process of explaining the topic. In order for students to better master scientific concepts, it is

advisable to use not only verbal, but also video, audio or computer programs. During the explanation stage, students should rely on their previously acquired knowledge. For example, like all living organisms, a person receives substances necessary for growth, development and the normal course of life processes with food. The substances necessary for the human body are: 1) organic substances: protein, fat, carbohydrates, vitamins; 2) inorganic substances: water, minerals. These substances perform important functions in the human body. Organic substances in food are large molecules with a complex structure. In order to deliver these substances to the cells, they must be broken down into small parts, that is, broken down. This process is performed by the digestive system. Digestion is the process by which substances taken in with food are broken down in the digestive system and absorbed into the blood. The digestive system includes the digestive tract and digestive glands. The digestive tract consists of the oral cavity, pharynx, esophagus, stomach, small intestine, and large intestine. The digestive glands include the salivary glands, gastric glands, intestinal glands, pancreas, and liver.

Digestion begins in the mouth. The mouth contains the tongue, teeth, and salivary glands. The teeth grind food. The tongue mixes the food and pushes it toward the pharynx. Food passes from the oral cavity to the pharynx, from there to the esophagus, and then to the stomach. The undigested part of the food passes into the large intestine and is excreted into the external environment.

The salivary glands secrete saliva into the oral cavity. Saliva moistens food, which makes it easier to swallow. In addition, saliva contains substances that neutralize bacteria. Many small glands in the stomach wall produce digestive juice. In the stomach, food is broken down with the help of digestive juice for several hours, that is, it is digested. Food particles pass from the stomach to the small intestine. The small intestine is the longest part of the digestive system. Here, nutrients are completely broken down and absorbed into the blood. This process is called digestion.

Stage 3 result: If students cannot immediately apply the knowledge gained in previous stages at this stage, the teacher should not worry - mastering scientific concepts takes time. When students can understand the connection between the learning and cognitive activities of previous stages and this stage, they can move on to the next stage.

Stage 4. Application. Students apply and develop the knowledge and skills they have learned in the Inquiry and Explanation phases. The goal of this phase is to help students apply new scientific concepts and skills in new contexts using videos, case studies, or other digital and written resources. In the Application phase, we ask students to build a model of the digestive system using a picture, slime, or clay. In this process, students work based on a STEAM approach, thereby ensuring interdisciplinary integration at this phase. Connecting science with math, art, technology, and other subjects allows for better understanding of scientific concepts.

Phase 4 Outcome: Students better understand scientific concepts and skills.

Phase 5. Assessment. This can be done at any stage of the lesson. Assessment involves determining the level of students' mastery of theoretical and practical knowledge. Assessment aims to gather evidence of the extent to which learning outcomes have been achieved. Formative assessment can be done in the form of observation or short question-and-answer sessions. Summative assessment uses multiple-choice or open-ended tests. Outcome of stage 5: The teacher determines the level of mastery of each student and class.

In summary, the main tasks of science education are:

- to instill in students the values of lifelong learning and national and universal values such as patriotism, active citizenship, initiative, openness, humanity, hard work, respect, and tolerance;
- to develop 21st century skills such as communication, creativity, teamwork, media literacy, critical thinking, problem-solving, and decision-making in students;
- to instill in students knowledge of basic concepts, theories, and laws of science;
- develop research skills in students (using models; defining research goals and creating a plan; conducting research; analyzing, evaluating, and drawing conclusions from research results)

References:

1. Z. B. Sangirova, K. T. Suyarov, M.T.Umaraliyeva, S. G'. Xasanova, D.T.Hasanova, M.K.Yuldasheva, Xalqaro ekspert: Philippa Gardom Hulme "Tabiiy fanlar". Umumiy o'rta ta'lim maktablarining 6-sinfi uchun darslik
2. Mullis, I. V. S., Martin, M. O., Goh, S., & Cotter, K. (Eds.) (2016). TIMSS 2015 Encyclopedia: Education Policy and Curriculum in Mathematics and Science. Retrieved from Boston College, TIMSS & PIRLS. pp.1-40
3. mceducation.com – Marshall Cavendish Education | Education Solutions Provider | MCE – Marshall Cavendish Education Pte Ltd -Singapur ta'lim nashriyoti platformasi