

# Where did food go to the body?- Cases of inquiry activity in digestive system

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**Abstract:** This article mainly in the science of life science innovation as the starting point of "food" to go to the instructional design of inquiry science education, this article tries to illustrate the science education of life science should pay attention to the learning process and the rules of children through the teaching design, pay attention to children's scientific concept and scientific experience as the foundation, combined with the relevant contents of multidisciplinary engineering, technology and art, to construct suitable children's development of scientific activities, and should be based on the practical needs of life science education practice knowledge to guide students, to enable children to study, cultivate their scientific inquiry ability.

## 1 Background and purpose

The activities around the "food in the body to go where" activities, training students to master the basic skills of biology, through experiment, observation, conjecture, collect data, draw conclusions, the formation of new research means to cultivate students' ability of observation, thinking, analysis and solve problems and put forward the question. A careful and realistic scientific attitude and innovative, each one airs his own views of divergent thinking, pioneering spirit. At the same time, students in depth understanding of the secrets of food digestion, saliva saliva digestion of comparative experiments and the identification of true and false honey, but also to develop their scientific literacy and practical ability.

## 2 Moving target

Scientific concept

The teeth, tongue and saliva in the process of digestion in the mouth, they have different functions. The food will undergo preliminary digestion process in the mouth.

The body's digestive organs including the mouth, esophagus, stomach, small intestine, large intestine, each organ has its own function.

The food will be in order to enter these digestive organs in the human body, is absorbed.

The salivary amylase digestion of starch

Process and method

You can on the basis of previous experience, understand the human body digestive organs, digestive function and process of understanding food digestive organs, and can be modified and improved in constant communication and discussion.

In contrast to the experimental design of saliva starch, hands-on ability.

The guide students through practical experience or by using various techniques to gather information, contact their life experience and other methods to deepen understanding of some digestive organ morphology and function.

Emotions, attitudes, values

Willing to cooperation and exchange with others, correctly understanding the imperfect research, and improved through repeated observation and discussion.

The human digestive system to arouse students' attention and interest, stimulate students' interest in science, scientific inquiry.



Make the students know how to protect the digestive organs of importance to human health, know how to cherish the digestive organs make the students get rid of the bad eating habits, diet and health.

### **3 Activity time, object and analysis**

Activity time: 3 hours

Participants: Sunshine doing small hit off the summer camp

The object of analysis: creating small summer camp campers ranging in age from 7---11, grade 1-4 students in primary school, the students of different levels of learning goals are different, the digestive organs for students is both familiar and unfamiliar, the children for the concept of digestive system and only scattered blurred, some students know many organs but, don't know what is the digestive organs and the position, not to say the role and process of digestion of the digestive organs. Although the students have developed some good eating habits, but still lack of systematic arrangement and the promotion of ideas, not to protect the importance of digestive organs set up. Many students themselves have some digestive organs problems and disease experience, the urgent need to learn through the science class, correct their bad knowledge and habits.

### **4 The key points, difficulties, innovation points**

Difficulty: the understanding of the digestive tract is a "black box" problem, the main difficulty of teaching is that it cannot give students the entity to explore, it is difficult for students to explore depth. We take a variety of activities to allow children to form the correct sequence of the digestive tract, especially the order of the large intestine.

Methods: according to the difficulty - learning characteristics of students, the course mainly through a lot of simulation activities to allow students to experience and explore, by means of the development of students' intuitive scientific thinking and logical reasoning ability, to students in the study before and after can be improved and perfected in understanding. Such as through their own perception of oral digestion process, the use of computer data access, to the teacher for advice, their own creativity to build digestive system model and other activities to deepen learning.

Key: 1. The students through the study of correcting the wrong or ambiguous concept, establish the correct scientific concept. 2. Understand the human body digestive organs, digestive organs to understand the function of each. 3. The experiment of "the digestion of saliva to starch" focuses on the design of experiment, the phenomenon of experiment and the analysis of experimental results.

Innovation points:

That embody the natural experience and scientific inquiry: let the children experience nature to emphasize the object to mobilize a variety of sensory observation and experience activities. Activities guide children to predict, design, contrast test, hands-on inquiry of saliva digestion of starch. The conjecture, experiment, thinking, communicating these science as inquiry process fully let students experience, learn to explore the inquiry, obtained from the growth of scientific knowledge, ability, experience the joy of scientific inquiry, to understand the essence of science, this is the whole process of science education. By the teacher let the students learn the knowledge, knowledge is not a conclusion, science education. So the students guess, guide students to help in the peer, teachers, such as the Internet, to find the correct map of digestive system, so as to the students through the observation and comparison, find out the differences, and students can be controversial and have common views of the place to find out joint research, deepen understanding, will find the rules used in practice, and reflection, generate a new subject: what are the characteristics of each organ, respectively, for what?

The research and Engineering: at work, family life and vacation how unified consideration of work efficiency, human health, safety and comfort of the disciplines involved in human engineering. Ergonomics is "physiology, numerology, geography" as the research direction of basic principles. Physiology is to study the function of human beings, and to solve the problem of human body health by the dialectic of Chinese medicine and the intuition of Western medicine, and explain the habits,



health and trend of human beings by using the principle of genetic factors. In the design of "knocking18 Shengjin" health care law strengthen children's health awareness and correct the saliva incorrect views, and how to protect the health of the digestive system, establish the correct health awareness, reflects for the sake of human health.

The contact real life application: stimulate scientific interest, understand the scientific truth. It is extremely important for students to be close to science, to use science in daily life, and to turn science into the guidance of their daily life. So the iodine contrast test identification of salivary amylase, can lead to test how to distinguish between true and false honey, will learn the scientific knowledge to real life. Exploration of oral digestive system leads us to protect the teeth, with the correct method of brushing. The discussion of the protection of the digestive organs can let the children develop good health habits.

The STEM education is not the lack of Art Education: STEM Science (Science), technology (Technology), engineering (Engineering), mathematics (Mathematics) education ". We not only pay attention to education, science and technology education in engineering education, mathematics education, and the activities of the last link in order to stimulate children's creativity, let them use some branches, leaves, pipes, balloons, brushes and other readily available items in groups in a large cardboard spell a human digestive graph model, such activities also art activities.

## 5 Specific programs

The content of activities

The front of the scientific concept: the first activity is to show the students where the food is in the picture and where they go. Is an unavoidable fact of students before the concept of existence, we put the pre concept of students as the starting point and the point of teaching, before the concept of exposure, and correction, instead of the students to use effective teaching strategies and methods, guide students before the concept into scientific concept.

To explore the digestion process of food in the mouth: to experience the process of chewing biscuits and swallowing, causing students to guess, verify, design of saliva, digestion of starch contrast experiment. Extended activity: identify the purity of honey.

Explore the composition of the digestive tract grouping: guide students to learn to use various resources.

Creative design: the design model of the digestive system using various materials.

Presentation: introduce the team's digestive system model, answer questions from teammates, accept your comments, and reward groups that perform well.

The education of science and technology resources

Computer, books, crayons, 1 meters \*0.8 meters of cardboard, balloons, biscuits, beaker, stir bar, iodine, water, experimental records, tubes, pipes, collecting branches leaf plants, cardboard, paper labels, prizes, different purity of honey, mirror, small intestine, large intestine model, the process of digestion and the digestive organ function video, multimedia courseware etc..

Table 1 Record list

Food name	Original state of food	After chewing 5 times What's the change?	After chewing 15 times What's the change?
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Activity process and steps

Activities are divided into guess prediction stage, experimental exploration stage, exchange discussion stage, art creation stage, production report stage.



Table 2 activity process and steps

Activity link		teacher behavior	student behavior
science concept The front side	Dead work	Release biscuits Welcome words, discipline requirements, heterogeneous grouping	Eat biscuits
	Scenario introduction	Lead activities: the classmates, you love to travel? Today, the teacher will take you to experience a special trip." (it is natural to elicit the topic: Food travels in vivo.) Where were the biscuits we ate just now? Oh, it's already started traveling in our body, so, the first stop of the cookie, we know where it is.	Question answering
	Layout task	Let the students display the food in the body with the pictures (drawing the students' pre concept)	Drawing
Explore the digestion process of food in the mouth	Trigger conjecture	Question: we chew biscuits, what happened in the mouth? In addition to change the shape of particles, there will not change? Chewing biscuits it will turn into other substances? Is there any way to prove it?	Reflection Question answering
	Please a mysterious substance - iodine	Brain sharp: what mountain can not climb? What water can't drink? What wine can't be drunk?	divergent thinking Question answering
	Design Contrast experiment	Magic skills can make food color iodine Question: can the iodine test before and after the occurrence of chewing biscuits do? Observing student activities Inspire and guide students to help students	Student design experiment Students do experiments to verify
	report experimental result	Please explain the students thinking, experimental data collected and the results of the experiment design.	Experimental results of students reporting experimental design ideas, the phenomena observed in experiment,
	Summary evaluation	teacher commenting Extended knowledge: saliva contains amylase, which can be easily	Reflection Put questions to



		decomposed into maltose. Clarify the scientific concept: teeth, tongue and saliva are involved in the digestion of food in the mouth, and their functions vary. The food will undergo preliminary digestion process in the mouth.	Communication
	Healthy Health care activities Traditional culture	Correct views on saliva (saliva not unclean things, with health care value) Knocking fluid activity (the origin of the word "live") - tongue edge water, Scientific method of brushing teeth	Reflection Study of teethCorrect method
	Extended activity	Question: can we identify the purity of honey with iodine. Teachers provide resources Guiding experiment	Reflection guess Hands-on experiment Come to conclusion
To explore the constitution of digestive tract by grouping	Trigger thinking	Question: where are the biscuits now?	In group discussion
	A thorough understanding of the scope of scientific inquiry technical education	Guide the students to learn the digestive system using various resources (let students understand, do their own experiments, a kind of inquiry, through the text, pictures, video data and other ways to study the problem, also belongs to the scope of scientific inquiry)	Reflection For peers, teachers, computer network, books, pictures and other resources to help
	protect Digestive organs	Teacher guidance: in real life, the digestive organs often do not listen, have you encountered digestive organ disease experience, who said? What is the cause of this?	discuss (how to protect the digestive organs)
Digestive system model of creative design	Art design (Ergonomics)	Teachers provide a wealth of materials to guide students to design the human digestive system model using existing or their own search materials	Reflection divergent thinking design a model
Report Exhibition	Sharing communication	Please tell the activities of experience, harvest, suggestion. Teacher review (reward principle is for every child to experience the success of comprehensive and individual awards prize).	The digestive system model group, answer questions we accept the evaluation team.
	Concluding remarks	Good students! Through their own continuous observation, experience, thinking, get a lot of knowledge about life science. When you learn more	



		knowledge of life science, you will find that life science is so interesting and meaningful, hope that students will continue to explore the mysteries of biology. Learn how to improve your life with scientific knowledge and methods.	
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The possible problems and solving plan

Different children's different levels of understanding of the digestive system, children may appear to understand the difference between the digestive system is too large phenomenon.

The settlement plan: in the activity, the heterogeneous grouping form, through group communication, imitation, mutual learning, let the children of different ages in the digestive system of learning companions, teachers or various resources to help build the model, will strengthen the cognition.

## 6 Activity effect and evaluation

Expected results and presentation

Expected results: students can participate in activities of intense interest in accordance with their own ideas, drawing, design experiments, test ideas and creative design model, sharing experience etc.. The teacher is the guider and the resource provider. Students can successfully complete the activity task, and relatively easy to achieve the moving target

Presentation: experimental record to contrast experiment records of students designed by saliva to digest starch, finally the students can design a model of the human digestive system full of creative, and can realize five digestive organs, digestive order know. Clearly, the human body has a whole set of organs to decompose food in a certain order, different digestive organs form is different, the role is also different.

Effect evaluation standards and methods

Evaluation is divided into two parts: process evaluation and summative evaluation, which are composed of students' self-evaluation, students' mutual evaluation and teacher evaluation. The evaluation can be carried out in the form of "sharing and exchanging" in oral form, and the collection, evaluation and teaching reflection can be carried out by filling in the "activity evaluation table" or "achievement evaluation table", and holding a forum.

The role of cultivating students' Scientific Literacy

In the activities of teachers to guide children to scientific inquiry in the right way, based on the children's original scientific concepts, through the question, that prediction, design and experimental observation, empirical data, and finally obtained for collection and analysis conclusion. Through the discussion of the recording process, it will form a new inquiry problem, which can naturally develop students' scientific ability of observation, classification, communication, measurement, inference and questioning. This method to explore the process oriented to science education, it emphasizes children's ability in the process and experiment, questioned from children on their interest, and through the operation of their own design activities to seek answers to questions. They observe, ideas, experiment, expression and communication activities of inquiry, the construction of basic scientific knowledge, so as to obtain preliminary scientific inquiry ability, it can help children to establish a scientific concept and correct cognitive model, training methods of children's scientific attitude, scientific spirit, scientific thinking and scientific thinking from childhood, to promote all-round development of children, so that they can lay the necessary foundation of good scientific literacy.

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