



# TEACHING "MEDICAL ELECTRONICS" USING "VENN DIAGRAM" IN HIGHER EDUCATION INSTITUTIONS.

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## Annotation

The role of modern pedagogical technologies in improving the quality of education is important. Pedagogical technology is a systematic method of designing, implementing, and evaluating educational processes that guarantee student-centered, democratic, and repeatable learning outcomes. Its difference from traditional methods is that it is directed not to memorizing the knowledge given to students, but to perform concrete actions at the end of the educational process [1]. The use of pedagogical technologies in the teaching of lectures on medical electronics serves to increase the quality of education. To date, the Venn diagram has been used in teaching English, teaching pedagogues, teaching mathematics and physics. However, this method has not been sufficiently researched in the teaching of lectures in the field of medical electronics. In this work, the application of graphic organizer Venn diagram in teaching subjects of medical electronics is presented. [2]

**Key words:** *Medical electronics, Venn diagram, biological tissues, Magnetodiagnostics, Magnetocardiography, Magnetoencephalograms, Paramagnetics, Diamagnets.*

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## INTRODUCTION

The reform of the educational system of modern medical electronics is aimed at improving the effectiveness of training medical electronics specialists in this area in the future, who not only have knowledge and skills, but are also ready to use them to solve the problems of professional activity established by the state educational standard of higher professional education.

The extremely rapid increase of new information during the continuous development of various fields of science has put

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great difficulties and problems in front of the modern methodology. What needs to be done to acquaint learners with modern knowledge and master science well is becoming an urgent problem. Pedagogical scientists all over the world are puzzled by this problem.

The science of medical electronics is an interesting science that combines modern medical devices and the principle of operation of these devices, treatment and diagnosis. The science of medical electronics is considered to be the basis of physics. Physics is a science that studies natural phenomena. In this subject, like

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other subjects, the topics become more complicated as you move to higher classes (courses). As a result, many students have difficulty mastering the subject. Students of the group who have not mastered the science of physics will face a number of problems in mastering the science of Medical Electronics by themselves. As a result, many students have difficulty mastering science. If a student reinforces the topic by asking questions to the teacher about the part of the topic that he does not understand in the new lesson, he will not have difficulty understanding the next topics. Observations show that most of the students who do not understand the subject are shy to ask the teacher a question.

Taking into account the above problem, educators should pay great attention to strengthening the current lesson and listen to the opinions of students. For this purpose, the use of new pedagogical technologies in the lesson is very effective.

Many developed countries of our time have great experience in using new pedagogical technologies that increase students' interest,

scientific creativity, and at the same time guarantee the effectiveness of the educational process. The basis of the experience is interactive methods, one of which is the "Venn diagram" strategy method.

The "Venn diagram" method serves to compare two or more concepts and objects and to depict the result in a drawing (Fig. 1). The spaces in each circle are used to write the differences; the common area formed when the circles intersect is used to record the common aspects of the two compared events (facts, concepts, etc.).

This method develops students' analytical approach to the subject and critical thinking skills, helps to identify the differences and similarities of objects, events and the like. On the basis of individual parts, it is used to develop the skills of mastering the general essence of the topic, and the strategy is implemented according to the scheme based on the formation of small groups. [3]

The writing board (board) is divided into four equal parts (according to the topic) and the scheme shown in Figure 1 below is drawn:

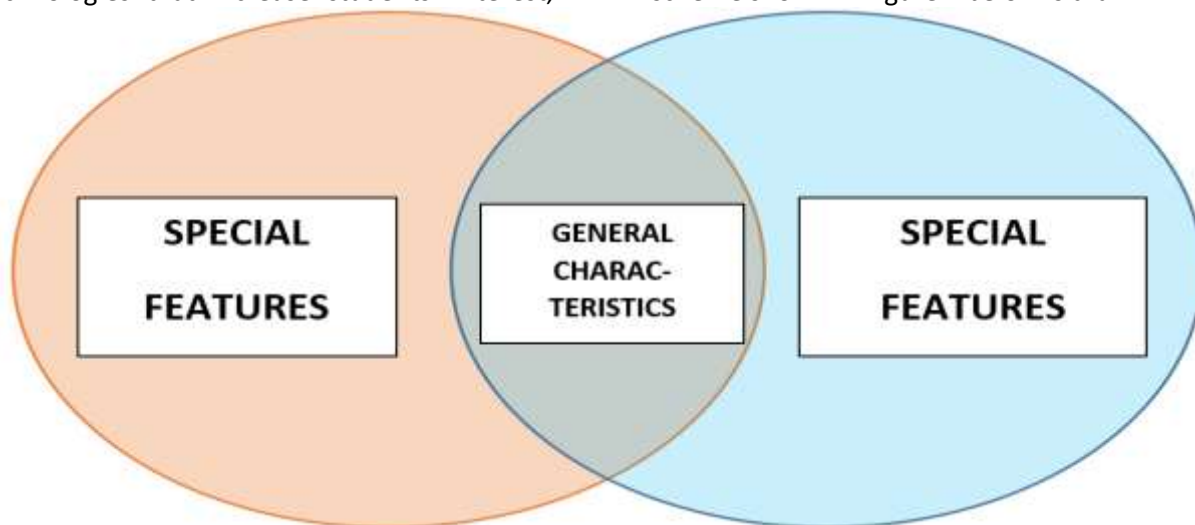


Figure 1. Venn diagram layout.

The strategy helps in the comparative analysis of the theoretical knowledge, information or evidence acquired by the students. It is more effective to use this strategy to organize final lessons on specific sections or chapters.

The stages of strategy implementation are as follows:

**Step 1.** Students are divided into three groups, and each group is given a separate assignment on the topic being mastered.

**Step 2.** Two intersecting circles are drawn on the board and divided into groups.

**Step 3.** After completing the tasks, leaders are selected from among the group members, and the leaders summarize the opinions expressed by the group members and fill in the diagram shown on the blackboard in turn.

**Step 4.** After writing down the characteristics, it is determined whether these two objects have common characteristics or



not. Notes about common features in the circles are deleted and they are written as one in the common area.

**Step 5.** Students will analyze the Venn diagram created by comparing two objects. The common and different aspects of these objects are once again paid attention to.[3,4]

Let's consider the application of the above method to strengthen the topic when passing the topic "Magnetic properties of biological tissues", which is taught in medical electronics at medical universities and institutes.

First, the teacher describes a new topic: Magnetic properties of biological tissues? Tells about their types and properties, what is their difference from each other. He mentions two types of research methods based on the magnetic properties of biological tissues and gives the following about them.

Magnetodiagnosics. The basis of magnetodiagnosics is the registration of the magnetic fields of biological tissues, which arise as a result of ongoing physiological processes in the tissues. Despite the small magnitude of the induction of these magnetic fields, their registration is carried out for diagnostic purposes.

1.Magnetocardiography is the most developed because the magnetic field of the heart has a relatively high magnetic induction value (Table 2). A magnetocardiogram has a

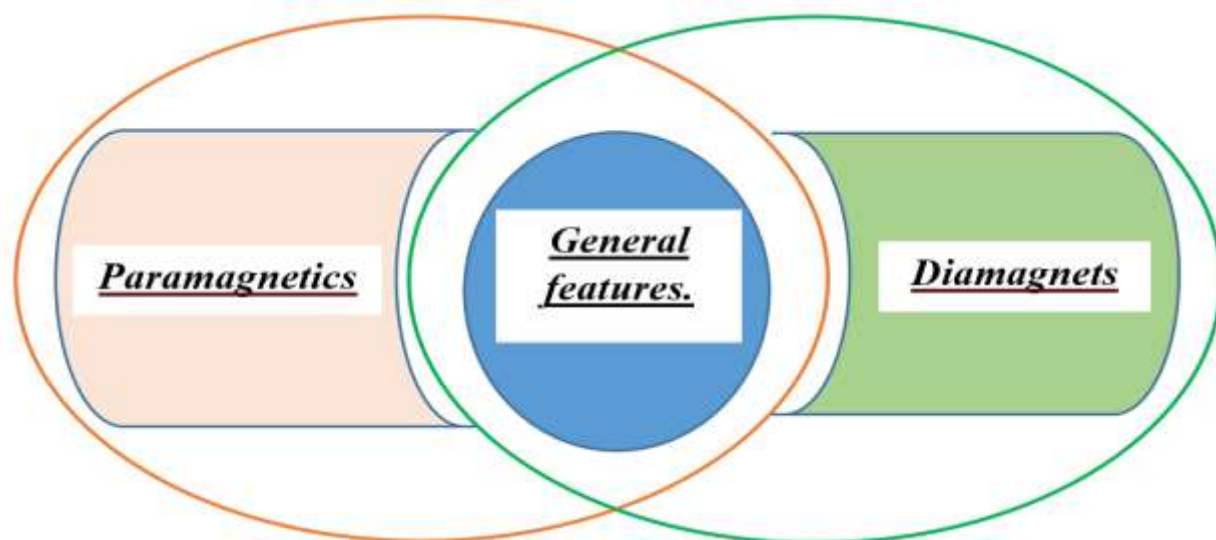
shape similar to an electrocardiogram, even the signs of the teeth are preserved. A certain advantage of magnetocardiography is to obtain diagnostic information without direct contact of the electrodes with the surface of the body and to obtain some new information about the activity of the heart.

2.Magnetoencephalograms. During magnetoencephalogram recording, new features of brain activity that are not visible in electroencephalograms were revealed. In particular, it was possible to distinguish the high-frequency component of the magnetic field of individual neurons of the human brain.

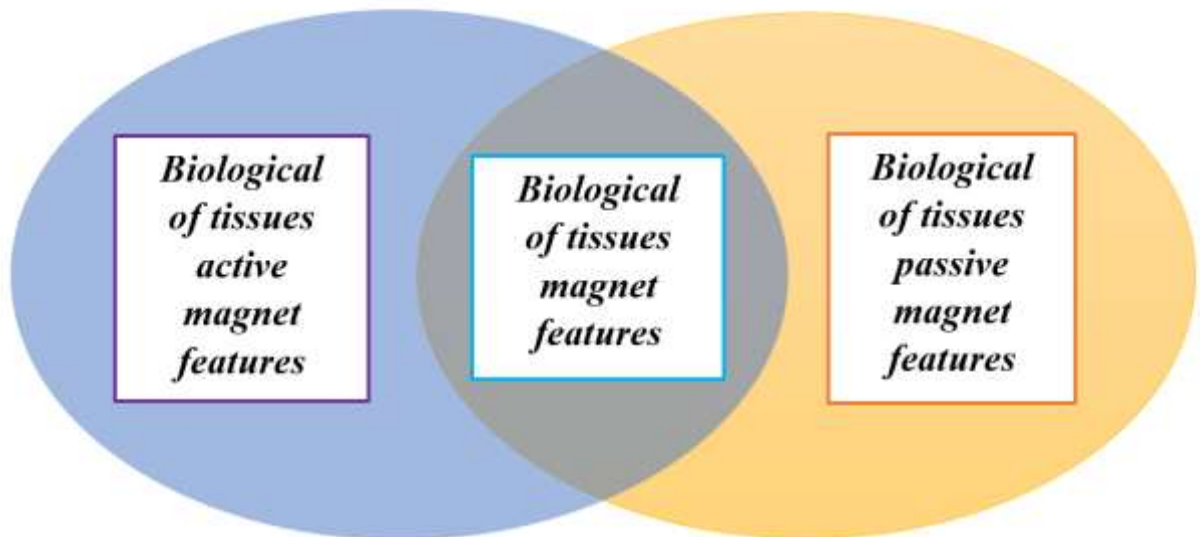
Then he explains the magnetic field and its properties, active and inactive magnetic properties of biological tissues. Giving an understanding of the principles and features of devices operating according to this law, the teacher demonstrates the principle of devices in a multimedia video. [5,6,7]

In order to strengthen the topic, to find out how much the students have mastered the topic, the students of the audience are divided into 3 groups. The groups are distributed the questions shown in the diagram in Figure 1 below.

**Group 1.** In this group, students consolidate their knowledge of Physics. They answer questions about the properties of the magnetic field.

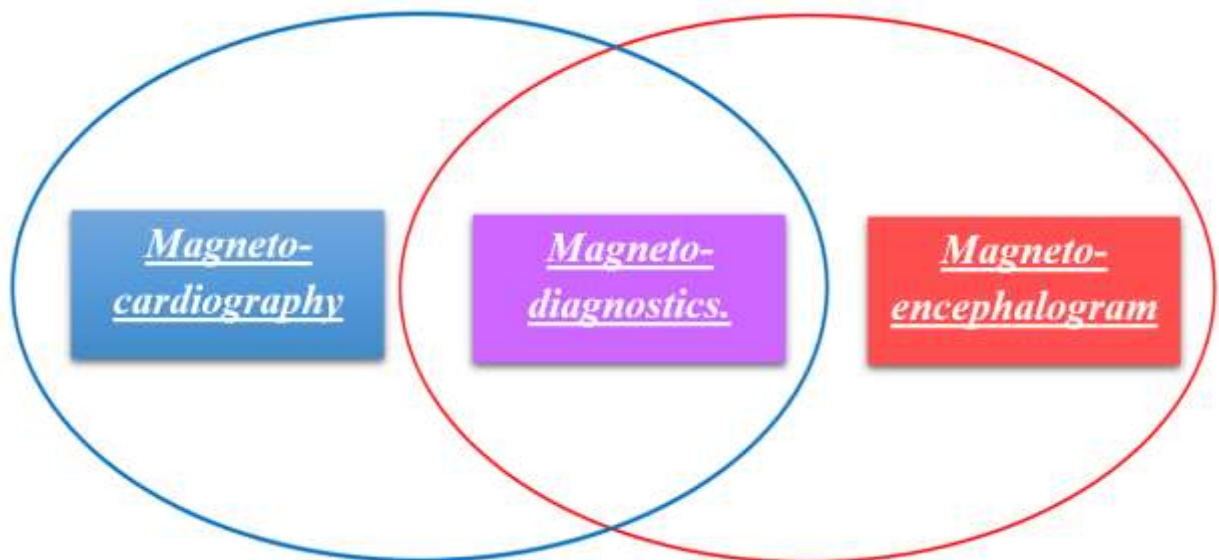


**Group 2.** Students in this group talk about the magnetic properties of biological tissues.



**Group 3.** This group provides information about research methods based on the magnetic properties of biological tissues.

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Groups are given 10-12 minutes to complete the diagrams.

After the allotted time, each group answers the given questions. In this, each member of the group shares his opinion. Of course, students can make mistakes here. When the group is answering the question, the teacher suggests that the student's mistakes and shortcomings be filled in by referring to other students. After that, the teacher gives the final conclusion. After the completion of this project, active students will be encouraged.

When applying this method to the teaching process, the following results can be

achieved:

1. Students learn to compare and contrast the concepts of Medical Electronics. By studying the connection between similar physical phenomena, finding common aspects of physical bodies, the way to small physical discoveries is opened. A creative approach to science appears.

2. The student listens and speaks, gets an answer to his question and is evaluated. A new topic is strengthened not by the help of the teacher, but by the cooperation of students.



3. It is clearly known which part of the subject the student could not strengthen, and the problem is solved in this lesson itself.

When we tried this method on the students of the 3rd stage of the Faculty of Children's Diseases of TashPTI, the method showed its effective results. Two groups were selected as a test. Group 1 was taught in a simple, traditional way. When this method was applied to the 2nd group, the class was full of intense debates and students actively participated.

We use Student's criterion to test the effectiveness of our research work. According to it, the confidence interval of the Medical Electronics Science grade was determined as 4.4 with a probability of 0.94. Efficiency in teaching medical electronics science is equal to 1.24. It follows from this that it can be seen that the effectiveness of using Venn diagrams in teaching lectures on Medical Electronics is high. [8]

#### Conclusion

In conclusion, the use of this method gives high results in the teaching of Medical Electronics. Because it increases the activity of each student in groups. Students will be able to express their opinion independently and defend it with reasons. Students' passion and interest in the science of Medical Electronics will increase, their attitude to the Science of Medical Electronics, and their worldview will expand. In this, the teacher helps the students, fills in their shortcomings and gives a general conclusion. Actively participating students are graded. Gives instructions to inactive students.

The use of the above pedagogical technology in medical electronics lessons was

also approved by the students. In contrast to the lesson process organized in a simple, traditional way, the lesson process conducted on the basis of new pedagogical technologies showed its significant effect.

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