METHODOLOGY FOR STUDYING THE TOPIC "SUPERPOSITION PRINCIPLE OF ELECTRIC FIELD VOLTAGE" WITH THE "I KNEW, I WANT TO KNOW, I LEARNED" METHOD

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Abstract. *This article presents the role and importance of modern pedagogical technologies, the difference between traditional and non-traditional lessons, how effective it is to use modern pedagogical technologies during the course of conducting lessons. Information about the "I knew, I want to know, I learned" and techniques for its use in classes are shown. The "I knew, I want to know, I learned" method was used to reinforce the most fundamental issues of the superposition principle of electric field amplification theme.*

Keywords: *modern pedagogical technology, "I knew, I want to know, I learned", electric charge, Coulomb force, electric field voltage, superposition principle of electric field voltage.*

Аннотация. *В данной статье представлена роль и значение современных педагогических технологий, разница между традиционными и нетрадиционными уроками, насколько эффективно использовать современные педагогические технологии в ходе проведения уроков. Представлена информация о методе «Я знал, я хочу знать, я научился» и методах его использования на занятиях. Метод «Я знал, я хочу знать, я научился" был использован для закрепления наиболее фундаментальных положений принципа суперпозиции при усилении электрического поля.*

Ключевые слова*: современная педагогическая технология, «Я знал, я хочу знать, я научился», электрический заряд, сила Кулона, напряжение электрического поля, принцип суперпозиции напряжений электрического поля.*

Annotatsiya. *Ushbu maqolada zamonaviy pedagogik texnologiyalarning o'rni va ahamiyati, an'anaviy va noan'anaviy darslarning bir-biridan farqi, darslarni olib borish davomida zamonaviy pedagogik texnologiyalardan foydalanish qanchalik samarali ekanligi keltirilib o'tilgan. "BBB metodi" haqida ma'lumot va undan darslarda foydalanish texnikasi ko'rsatilgan. "Elektr maydon kuchlanganligining superpozitsiya prinsipi" mavzusining eng asosiy masalalarini mustahkamlash uchun "BBB" metodidan foydalanilgan.*

Kalit so'zlar: *zamonaviy pedagogik texnologiya, "BBB metodi", elektr zaryadi, Kulon kuchi, elektr maydon kuchlanganli, elektr maydon kuchlanganligining superpozitsiya prinsipi.*

Today, various modern pedagogical technologies are widely used in the educational process, which activate the educational activities of students while maintaining the traditional form of lessons. In most cases of traditional classes, the teacher speaks. This weakens student activity to some extent. In non-traditional classes, in contrast to the traditional lesson, the harmony of image and sound increases the activity of students and their interest in the topic under way. The resulting knowledge serves to be preserved in his memories for the long term. The most important thing is to motivate students to work independently and think. Taking advantage of the convenience and capabilities of modern pedagogical technologies, when students are visually explained the physical processes and phenomena, the sum of the knowledge, skills and qualifications that they acquire is embodied. This leads to higher efficiency of teaching in the educational process [1]. To this end, in this article we will use the "I knew, I want to know, I learned" method to strengthen the most fundamental issues of the topic superposition principle of electric field voltage.

I knew, I wanted to know, I learned method-this method can be used in a new knowledge-giving type lesson [2]:

Step 1: A new topic is written on the board. Student notebooks are offered to write "I knew" what they know about this new topic. Three minutes are given for this. A presentation is held. During the presentation, readers will tell what they know about the new topic. During the presentation, the rule of not repeating thoughts back by groups is strictly observed.

Step 2: Students write "I want to know" in their notebooks. Then it is proposed to write what he wants to know about the new topic. This is given three minutes. A presentation is held. After that, information is explained by the teacher, which students want to know about the new topic.

An electric field is also generated by a single point charge, but often an electric field is mainly generated by a system of charges. If we introduce a Test charge at any point in the field formed by the charge system, it is influenced by forces from each charge. The equal impactor of all forces acting on the test charge is equal to: $\vec{F} = \vec{F}_1 + \vec{F}_2 + ... + \vec{F}_n$

Then the voltage of the field at the point where the charge is introduced is:

$$\vec{E} = \frac{\vec{F}}{q_s} = \frac{\vec{F}_1 + \vec{F}_2 + ... + \vec{F}_n}{q_s} = \frac{\vec{F}_1}{q_s} + \frac{\vec{F}_2}{q_s} + ... + \frac{\vec{F}_n}{q_s} = \vec{E}_1 + \vec{E}_2 + ... + \vec{E}_3$$

$\vec{E} = \vec{E}_1 + \vec{E}_2 + ... + \vec{E}_n$ (1) - this formula is called the superposition principle of an electric field, and it is defined as: the electric field voltage generated by a system of charges at a point is equal to the vector sum of the field voltage of each charge entering the system at that point. (The word superposition means join or fall over). The electric field voltage of a point charge is found using the formula: $E = k \cdot \frac{|q|}{r^2}$ (2) Here: $k = \frac{1}{4\pi\varepsilon_0} = 9 \cdot 10^9 \frac{N \cdot m^2}{C^2}; \varepsilon_0 = 8{,}85 \cdot 10^{-12} \frac{C^2}{N \cdot m^2}$

The condition for the electric field to be homogeneous holds invariant without the coordinate being dependent: $\vec{E} = const$

When the voltage vector is the same at all points, such a field is called a homogeneous electric field.

Resultant electric field voltage

Where the field is generating a 2-point charge, according to the superposition principle, the resultant field voltage is represented by the formula $\vec{E} = \vec{E}_1 + \vec{E}_2$ [3].

The resulting electric field voltage modulus is found using the formula:

$E = \sqrt{E_1^2 + E_1^2 + 2 \cdot E_1 \cdot E_2 \cdot \cos\alpha}$ (3)

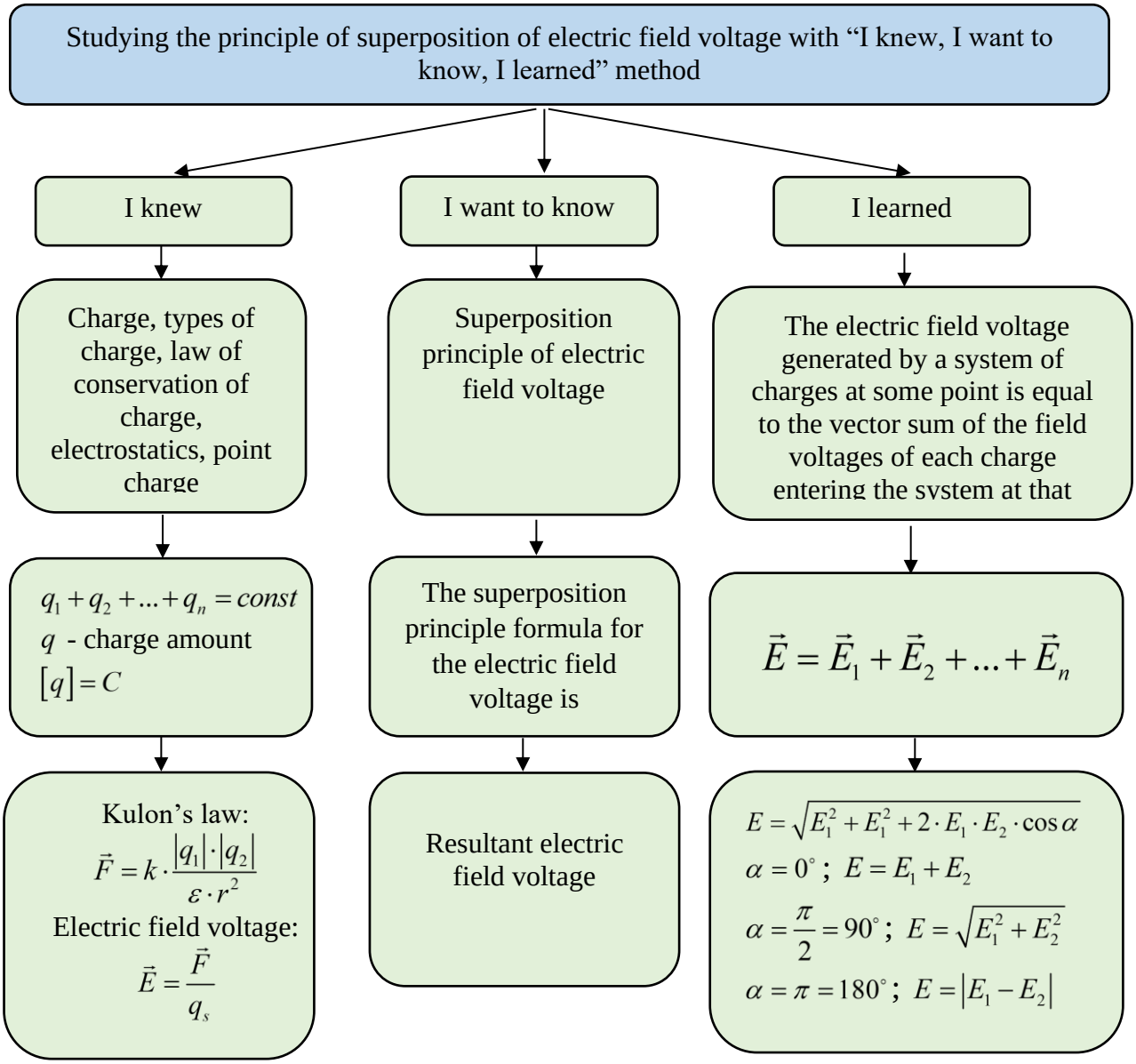
For some private values of α (3) we make the formula look simple:

1) $\alpha = 0^\circ$; when the electric field voltage vectors are in the same direction: $E = E_1 + E_2$

2) $\alpha = \frac{\pi}{2} = 90^\circ$; where the electric field voltage vectors are in the mutually perpendicular direction: $E = \sqrt{E_1^2 + E_2^2}$

3) $\alpha = \pi = 180^\circ$; where the electric field voltage vectors are in the opposite direction: $E = |E_1 - E_2|$

Step 3: Students are invited to write "I learned". Students write in their notebooks what they understand on a new topic. To do this, they are given ten minutes. After ten minutes have elapsed, a presentation is held. The new topic is told by students.



In all steps, students are required to follow the rule of listening to each other. And by the teacher, the materials left unspoken on the new topic are filled in on time.

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