VACCINE: ITS RELATIONSHIP BETWEEN HEALTH AND BASIC EDUCATION

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ABSTRACT

The research aimed to promote awareness and understanding actions to high school students of a State School in the Municipality of Nazaré da Mata - PE about the importance of vaccines in the prevention of diseases, through the combination of a didactic lecture and a playful activity, with the main purpose of consolidating the knowledge acquired and encouraging health practices based on scientific evidence. For the methodological procedure, the action research was divided into five stages and these stages were arranged in 3 different moments. The overall percentage of correct answers in the playful activity was 66%. From the analysis of the results obtained before and after the lecture, it was found that time and competition are antagonists in the students' performance, even if the later results, in general, were significant. The methodology used allowed that, despite the challenges proposed by the quiz, the students interacted positively with the approach. This contributed significantly to the understanding of the contents covered and was effective in building the relationship between teaching and learning.

Keywords: Education. School. Kahoot. Active methodologies. Vaccine. Public health.

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INTRODUCTION

The immune system performs the function of protecting the body against infectious and inflammatory agents, this system is divided into the innate immune system and the adaptive immune system. The innate immune system is formed by neutrophils, NK (Natural Killer cell) lymphocytes, macrophages and other cells, such a system is the body's first line of defense against invading microorganisms, becoming essential in the balance to keep the organism healthy (Sordi *et al.*, 2020).

In the case of the adaptive or acquired immune system, the defense is acquired throughout the individual's life according to the contact of the individual's body with a certain pathogen (bacteria, viruses, parasites, and fungi), this adaptive system is composed mainly of B and T lymphocyte cells (Veloso, 2022). According to Lima (2022), vaccines stimulate this adaptive immunity by sensitizing the body to a certain pathogen, creating an immunological memory, so when there is a new contact of the body with a certain pathogen, the body will activate the antibodies again, triggering the immunization process.

The term "vaccine" emerged in 1796 from the studies of the English scientist Edward Jenner from his studies on cowpox (Pereira and Souza, 2023). Vaccines are immunizing substances prepared with the main purpose of stimulating the body generating an immune response that aims to prevent diseases in a population (Ministry of Health, 2007). In general, this substance provides immunological subsidies to stimulate the production of specific antibodies against infections caused by viruses or bacteria (Pfizer, 2023).

The composition of the vaccine contains one or more than one antigen, and these are specific targets in the immune response it seeks to induce (Vilanova, 2020). Antigens are referred to in the literature consulted as foreign agents, which are characterized by viruses, bacteria, parasites, or fungi, which in contact with the body obtain the ability to bind in a specific way to generate an immune response (Rodrigues, 2022).

According to Cardoso *et.al* (2021), vaccines are considered the best resource for preventing infectious diseases. The authors point to vaccines as the best method of controlling these diseases, as they enhance the creation of antibodies by conferring immunological memory to the individual's body. In this way, immunization is an important tool for public health (Franco and Pereira, 2021).

Despite the importance of the vaccine in public health, Ramos *et al.* (2023) states that anti-vaccine movements are increasingly becoming persuasive and frequent. According to the authors, misinformation about vaccines is the pivot of this problem.

Thus, there is an urgent need to disseminate information based on scientific evidence on the subject. Menezes and Gomes (2024) state that it is essential to establish

practices for the population through a multidisciplinary approach to health promotion. The authors point out that the school environment becomes an important agent with regard to health education.

The guidelines on "Vaccine" and "public health" are provided for in skill 10 (EM13CNT310) of the National Common Curriculum Base (BNCC) for high school, in the discipline of Biology, thus, the guiding documents of the BNCC establish a relationship between the teaching of science in basic education and health.

Ferrari (2020) clarifies that it is essential to disseminate and teach various types of science, offering scientific activities especially in school spaces. Nevertheless, Silva et al. (2020) point out that the main objectives of the school space and education is to transform more reflective and critical subjects in society.

According to Augustinho and Vieira (2021), active methodologies are effective allies for students' meaningful learning in science teaching. The research used the lecture and the kahoot game as the main tools to promote learning of the content covered. The use of educational games by teachers has become a recurrent practice (Callegari, 2020). Didactic games are fundamental and viable tools in the construction of students' knowledge, allowing them to achieve meaningful learning (Andrade; Silva, 2020).

The research described in this article was triggered through the result of observations and reflections on themes studied in basic education according to the curriculum of Pernambuco in view of the experiences that occur during the supervised internship in the internship field, aligning the reflections diagnosed on the school floor with the theories and practices that make up the contents of the curricular components of the teaching degree course, with the student as the protagonist. Scalabrin and Molinari (2013) see the internship as "... An instrument that can make a difference for those who are entering the field of work related to education and who have the ability to transform the unfortunate reality of education in our country, which is far from satisfactory." Pimenta (1997) states that the internship is indispensable in the process of teacher training.

In view of the above, the research aimed to promote awareness and understanding actions among high school students from a State School in the Municipality of Nazaré da Mata-PE about the importance of vaccines in the prevention of diseases, through the combination of a didactic lecture and a playful activity, with the main purpose of consolidating the knowledge acquired and encouraging health education based on scientific evidence.

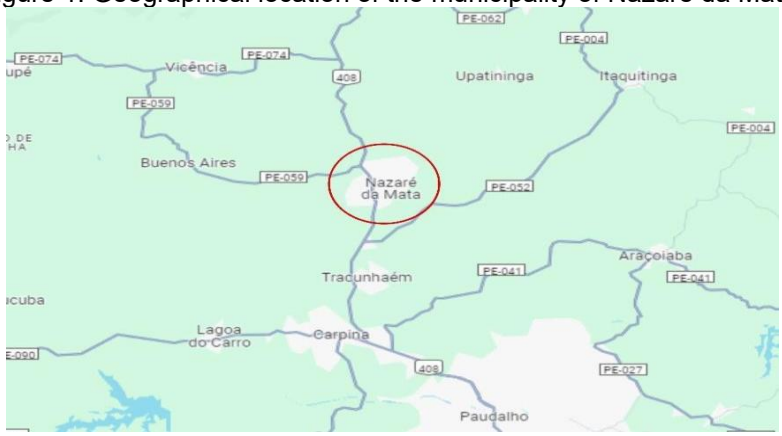
METHODOLOGY

TYPE OF RESEARCH

For the development of this research, action research was adopted. According to Silva *et al.* (2021) action research aims to extinguish paradigms between the researcher and the research participant. Thus, it ensures more integration between the research subjects, providing greater exchanges of knowledge about the thematic area to be studied, in addition to being favorable in the construction of paths for learning.

The research was applied in a State School in the Municipality of Nazaré da Mata – PE, located in the northern forest zone of the State of Pernambuco. This municipality has a territorial area of 130,572 km2 and a resident population of 30,648 inhabitants according to the last census of the Brazilian Institute of Geography and Statistics (IBGE, 2022). Figure 1 below shows the geographical location of the Municipality of Nazaré da Mata.

Figure 1. Geographical location of the municipality of Nazaré da Mata.

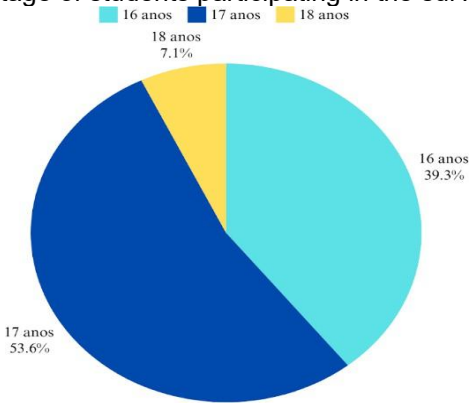


Source: Google Maps, 2024.

TARGET AUDIENCE OF THE RESEARCH

The target audience of the research was students from the 3rd year of high school. The first contact with this class was through Supervised Internship IV started in April 2024 and ended in June of the same year. In all, 28 students aged 16 to 18 years participated in the research (Graph 1).

Graph 1. Percentage of students participating in the survey by age group.



Source: Authorship, 2024.

STAGES OF THE RESEARCH

The research that was applied at the school was divided according to the steps below.

Stage 1: During the period from 2023 to 2024, a bibliographic survey was carried out on the proposed theme, in order to carry out a preliminary analysis on the theme of education and health. Articles from the last five years (2020 to 2024) involving the following descriptors were considered: "vaccine", "school", "adolescent vaccination", "prevention of diseases at school" and "vaccination campaign", in addition to the Ministry of Health website and the Pfizer Brazil website.

Stage 2: In April 2024, the organization of the intervention that would be carried out at the school began. The digital material was assembled in the Canva software in Slides (Figure 2), which was later presented to compose the lecture entitled "Vaccine: its importance in the immunization of the body in the prevention of diseases" to students with the help of a notebook and television.

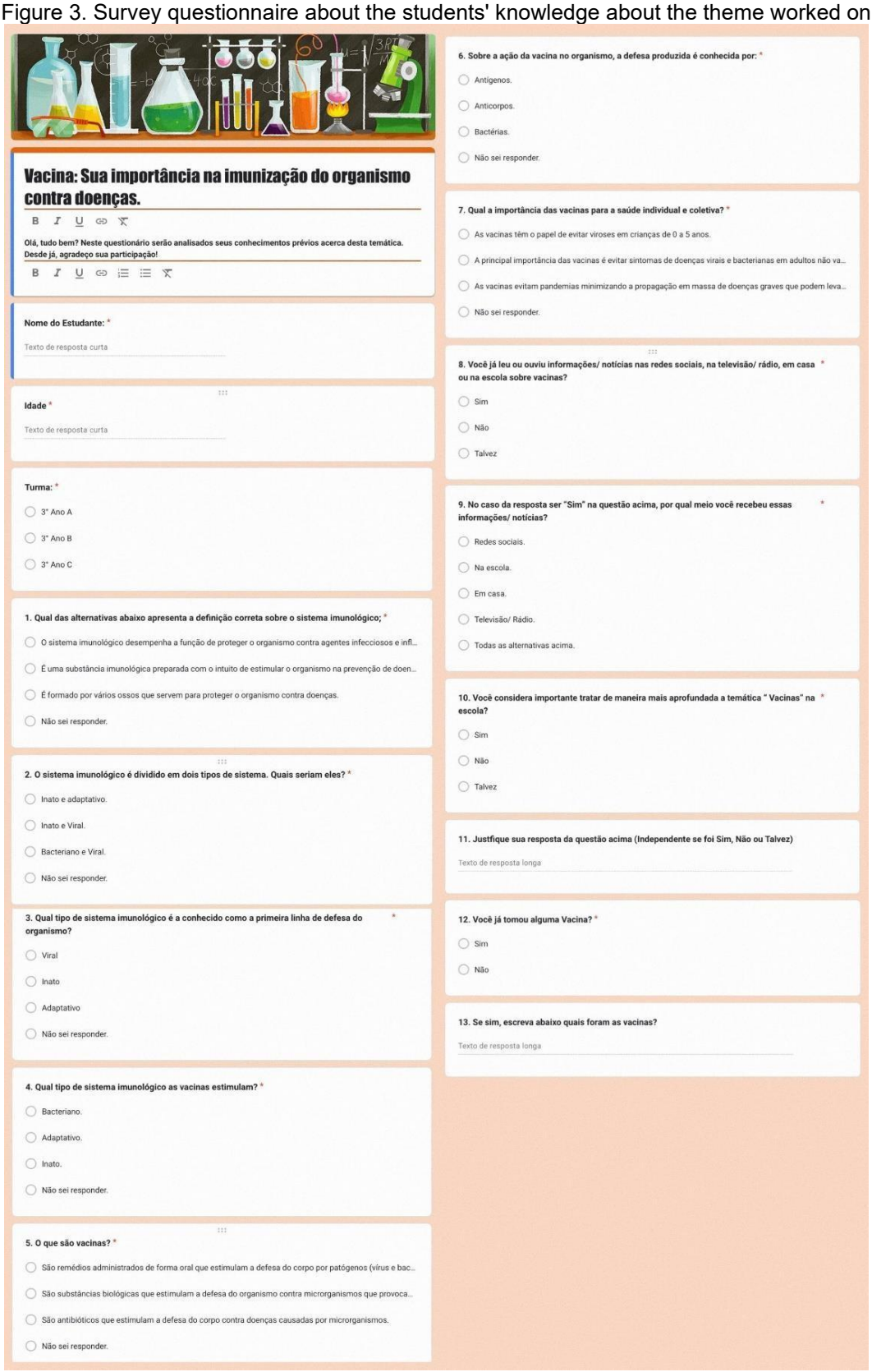
Figure 2. Slides used to compose the lecture.

Source: Authorship (2024).

In the lecture slides as seen above in figure 2, concepts about the vaccine, historical context, fake news involving vaccines, definition of the immune system, difference between the innate and acquired immune system, the importance of the vaccine, how the vaccine acts on the immune system and a brief timeline on vaccination in Brazil were addressed.

Stage 3: The stage was carried out in the same period as the previous one, in which the survey questionnaire was prepared in the Google Forms software (Google Forms), the questionnaire contained 13 questions on the theme, however it had 11 multi-school objectives and 2 discursive questions (Figure 3).

Figure 3. Survey questionnaire about the students' knowledge about the theme worked on



Vacina: Sua importância na imunização do organismo contra doenças.

Olá, tudo bem? Neste questionário serão analisados seus conhecimentos prévios acerca desta temática. Desde já, agradeço sua participação!

Nome do Estudante: *
Texto de resposta curta

Idade *
Texto de resposta curta

Turma: *
- 3° Ano A
- 3° Ano B
- 3° Ano C

1. Qual das alternativas abaixo apresenta a definição correta sobre o sistema imunológico; *
- O sistema imunológico desempenha a função de proteger o organismo contra agentes infecciosos e infl...
- É uma substância imunológica preparada com o intuito de estimular o organismo na prevenção de doen...
- É formado por vários ossos que servem para proteger o organismo contra doenças.
- Não sei responder.

2. O sistema imunológico é dividido em dois tipos de sistema. Quais seriam eles? *
- Inato e adaptativo.
- Inato e Viral.
- Bacteriano e Viral.
- Não sei responder.

3. Qual tipo de sistema imunológico é a conhecido como a primeira linha de defesa do organismo? *
- Viral
- Inato
- Adaptativo
- Não sei responder.

4. Qual tipo de sistema imunológico as vacinas estimulam? *
- Bacteriano.
- Adaptativo.
- Inato.
- Não sei responder.

5. O que são vacinas? *
- São remédios administrados de forma oral que estimulam a defesa do corpo por patógenos (vírus e bac...
- São substâncias biológicas que estimulam a defesa do organismo contra microrganismos que provoca...
- São antibióticos que estimulam a defesa do corpo contra doenças causadas por microrganismos.
- Não sei responder.

6. Sobre a ação da vacina no organismo, a defesa produzida é conhecida por: *
- Antígenos.
- Anticorpos.
- Bactérias.
- Não sei responder.

7. Qual a importância das vacinas para a saúde individual e coletiva? *
- As vacinas têm o papel de evitar viroses em crianças de 0 a 5 anos.
- A principal importância das vacinas é evitar sintomas de doenças virais e bacterianas em adultos não va...
- As vacinas evitam pandemias minimizando a propagação em massa de doenças graves que podem leva...
- Não sei responder.

8. Você já leu ou ouviu informações/ notícias nas redes sociais, na televisão/ rádio, em casa ou na escola sobre vacinas? *
- Sim
- Não
- Talvez

9. No caso da resposta ser "Sim" na questão acima, por qual meio você recebeu essas informações/ notícias? *
- Redes sociais.
- Na escola.
- Em casa.
- Televisão/ Rádio.
- Todas as alternativas acima.

10. Você considera importante tratar de maneira mais aprofundada a temática " Vacinas" na escola? *
- Sim
- Não
- Talvez

11. Justfique sua resposta da questão acima (Independente se foi Sim, Não ou Talvez)
Texto de resposta longa

12. Você já tomou alguma Vacina? *
- Sim
- Não

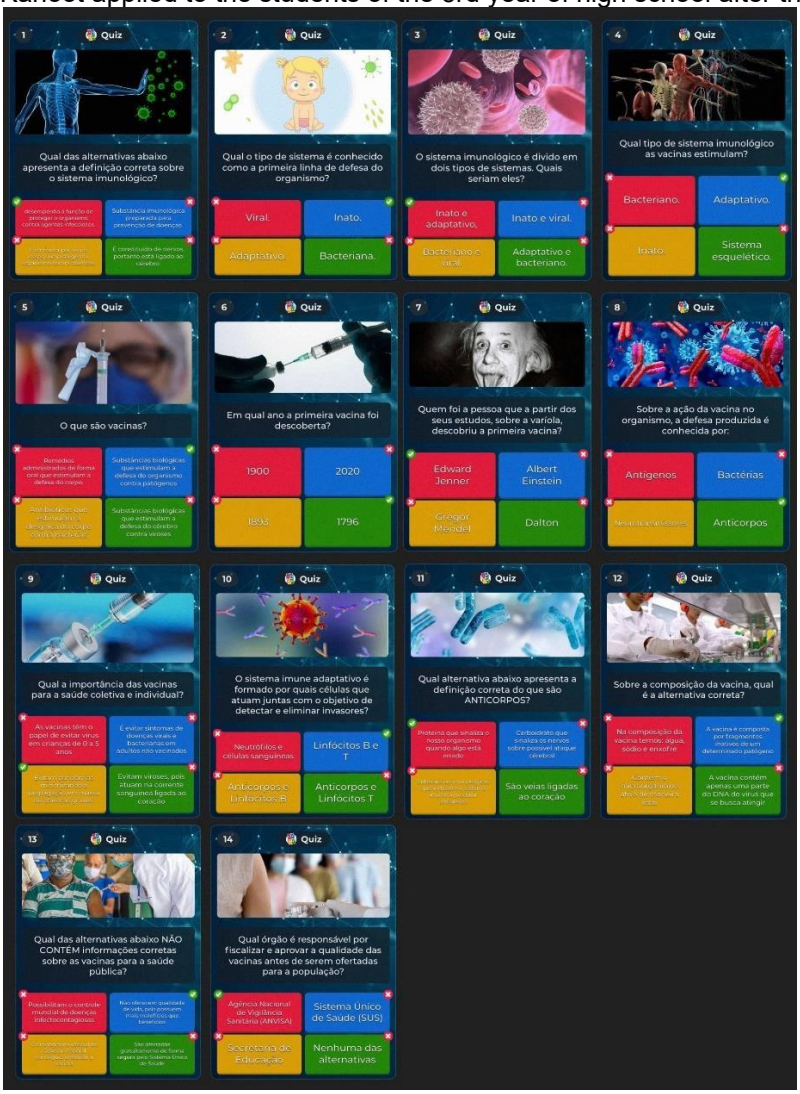
13. Se sim, escreva abaixo quais foram as vacinas?
Texto de resposta longa

Source: Authorship (2024).

Stage 4: A quiz was made in the Kahoot software in order to evaluate the knowledge acquired by the students after the lecture. The quiz contained 14 objective questions with 4 alternatives each, 7 of which were repeated from the probing questionnaire and 7 added

exclusively to the game on other topics in the thematic area addressed during the lecture. Each question had 20 seconds to be answered. Such information can be seen below in Figure 4.

Figure 4. Kahoot applied to the students of the 3rd year of high school after the lecture.



Source: Authorship (2024).

Stage 5: In May, the pedagogical intervention was applied in the classroom to the students. The intervention took place during the biology class, which lasted 50 minutes, and was divided into 3 moments listed below.

Moment 1: The link to the Google Forms polling questionnaire was released via whatsapp in the class group by the biology teacher. The class had approximately 10 minutes to answer the survey questionnaire.

Moment 2: After the students finished the survey questionnaire, the lecture entitled "Vaccine: its importance in the immunization of the body in the prevention of diseases" took

place, the class had an average of 30 minutes of lecture. This moment in the classroom can be seen in Figures 5.

Figure 5. Lecture to students in the 3rd year of high school.

Source: Authorship (2024).

Moment 3: After the end of the lecture, the participants were evaluated through the playful activity in the kahoot application. During this moment, the students had an average of 10 minutes to play the quiz.

After the completion of the 3 moments described above carried out at school with the students, an analysis of the results obtained in the survey questionnaire and the results acquired in Kahoot after the lecture was made. The answers obtained were counted and transcribed in the form of graphs. In the case of the discursive questions of the probing questionnaire, the students were enumerated by E1, E2 and so on to create a discussion based on their answers.

RESULTS AND DISCUSSIONS

The 7 questions applied in the survey questionnaire (QS) and in the Kahoot (QK) were analyzed (Chart 1). In the first question, I asked the students the correct definition of the immune system. After analyzing the results obtained, 85% of correct answers were observed in the probing questionnaire (QS) and 85% of correct answers in the Kahoot (QK). In the second question, it was explained that the immune system was divided into two types, and soon after the students were asked what these two types were. The total number of correct answers in the QS was 39.3% and in the QK it was 75%, visibly showing a considerable evolution. In the third question, the students were asked which of the immune systems was known as the body's first line of defense, in this question the correct answers were 53.6% in the Questionnaire and 80% in the Kahoot.

Regarding the topic "vaccine", the fourth question asked what type of immune system the vaccines stimulate, the previous answers observed were 60.7% and subsequent was 75%. In the case of the fifth question, students were asked "what are vaccines?", 85.7% of correct answers were identified in the questionnaire and 80% in Kahoot. In the sixth question, I asked about the defense that is produced by the vaccine, in this question the correct answers observed were 92.9% in the QS and 75% in the QK.

In the last question, students were asked if they were aware of the importance of vaccines for individual and collective health, in the survey questionnaire the correct answers were 96.4% and in the Kahoot they were 75%.

Table 1. Simultaneous analysis of the correct answers of the 7 questions of the survey questionnaire and the Kahoot of the students of class C of the 3rd year of high school.

QUESTIONS	Correct answers in the survey questionnaire	Correct answers in the kahoot quiz
1. Which of the following presents the correct definition of the immune system	85%	85%
2. The immune system is divided into two systems. What would they be?	39,3%	75%
3. Which type of immune system is known as the body's first line of defense?	53,6%	80%
4. What type of immune system do vaccines stimulate?	60,7%	75%
5. What vaccines?	85,7%	80%
6. Regarding the action of the vaccine in the body, the defense produced is known by:	92,9%	75%
7. What is the importance of vaccines for individual and collective health?	96,4%	75%

Source: Authorship, 2024.

In the Science curriculum of the early years of Pernambuco (2018), the skill EF04CI08APE focuses on understanding the organizational structures of living beings, including body systems. The high rate of correct answers in the first question of the questionnaire and in Kahoot shows that most students in the 3rd year of high school already had a good understanding of this content because they had already had contact with the subject in the initial grades, which facilitated the understanding of the theme proposed in the lecture.

On the other hand, the percentage of correct answers in the survey questionnaire in the second and third questions, within the same content, were the lowest. However, after the lecture, there was a significant increase in the correct answers to these two questions in the kahoot, as shown in Chart 1.

Nascimento and Feitosa (2020) state that the use of active methodologies in teaching offers important subsidies for critical and reflective training, promoting meaningful

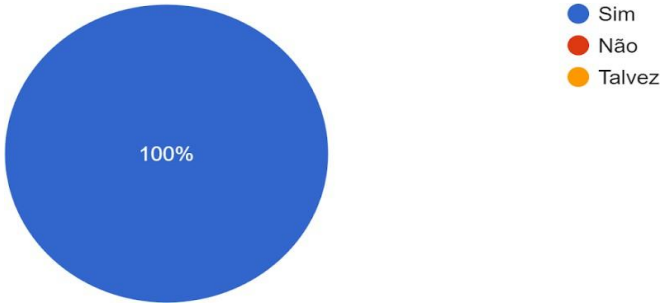
learning, especially when the student interacts with the content covered. Corroborating Azevedo *et al.* (2021) highlight that the use of differentiated methodologies, such as gamification, favors student participation in classes, enriching the teaching and learning process.

In the fourth question, the correct answers in the survey questionnaire were expressive. However, after the lecture, the evolution of correct answers in the kahoot was 14.3%, reaffirming the effectiveness of active methodologies in the construction of learning (Piffero *et al.,* 2020). The number of correct answers of class C of the 3rd year in the fifth, sixth and seventh question in the survey questionnaire was significant, as the content about vaccine, public health and biotechnology are provided for in the EM13CNT310 skill of the National Common Curriculum Base (BNCC, 2018) in the specific skill EM13CNT310BIO23PE of the Pernambuco curriculum for the 2nd year of high school, that is, the students had contact with the content in the previous school year, and are therefore familiar with the subject studied.

In kahoot, the correct answers in the fifth, sixth and seventh questions were expressive, although they were lower than in the survey questionnaire. Asked why the errors increased after the lecture, some students mentioned the lack of attention caused by the competition between them to quickly answer the questions in the game, leading to incorrect markings. On Kahoot, in addition to the correct answer, the score is also determined by the time it takes users to answer the questions. Oliveira and Andrade (2023) highlight that Kahoot, in addition to being attractive and playful, brings challenge and competition, increasing students' enthusiasm and motivation to learn.

In the eighth question of the survey questionnaire, students were asked if they had ever read or heard information on social media, at home, or at school about vaccines. In the analysis of the results obtained, it was identified that 100% of the students participating in the research had already read or heard information about vaccines (Graph 2).

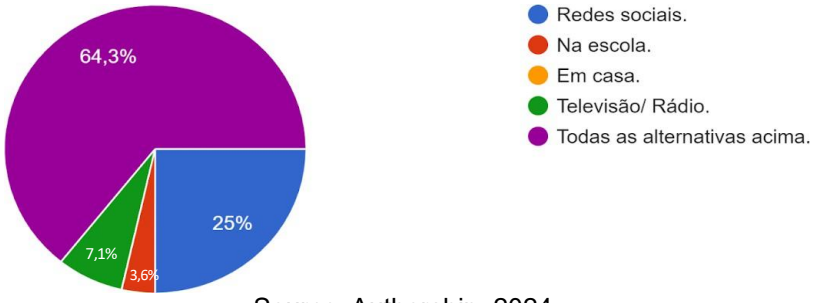
Graph 2. Percentage of 3rd year students who have already read or heard information/news about the vaccine.



Source: Authorship, 2024.

In the ninth question, the students were asked how they had access to this information/news. It was observed that 64.3% of the participants had access through various means, such as social networks, at school, at home and on television or radio, and 25% of the students had access through social networks, 7.1% had access through television or radio and 3.6% had access only through school. Such information can be seen in graph 3.

Graph 3. Means by which students in class C of the 3rd year obtained access to information/news about the vaccine.



Source: Authorship, 2024.

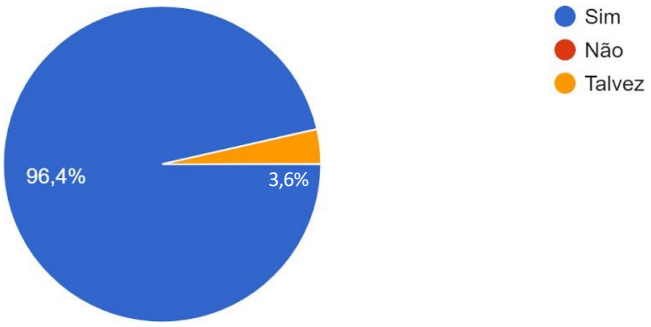
The analysis of graph 2 revealed that the adolescents participating in the research were aware of the topic addressed. Souza (2022) points out that in recent generations innovations and scientific discoveries have increased, significantly impacting the lives of individuals.

Graph 3 shows that most students read or heard information/news about vaccines from various media. However, during classroom discussions, many of them admitted to having had greater access to this information through social networks. In addition, 25% of the students revealed in the questionnaire that they obtained information exclusively through social networks through the internet. According to Neves and Borges (2020), the internet is considered one of the main means of communication. However, the authors highlight the importance of discussing the dissemination and dissemination of news and information on social networks, especially due to the ease and speed that fake news spread.

According to the analysis of Graph 3, only 3.6% of the students obtained information/news about vaccines through school, revealing a low percentage of dissemination of scientific information on the subject in the school environment. This contrasts with the guidelines of the National Common Curricular Base (BNCC, 2017) for high school, which, as highlighted on the website of the Ministry of Education (MEC), aims to develop competencies and skills in various areas of knowledge for the social and professional life of students.

In the tenth question of the questionnaire, the students were asked if they considered it important to deal with the theme in depth at school, and 96.4% of them said "yes" and 3.6% said "maybe" (Graph 4).

Graph 4. Percentage of students who answered about the importance of the vaccine topic being addressed in the school environment.



Source: Authorship, 2024.

In the eleventh question, he asked the students to justify their answer to the previous question with their words. Among the 28 answers, 7 answers from the students were selected, being enumerated by E1, E2, E3 and so on. This information can be seen in Chart 2.

Table 2. Justification of the answers to the tenth question of the 7 students of class C of the 3rd year about the importance of the vaccine theme being addressed at school.

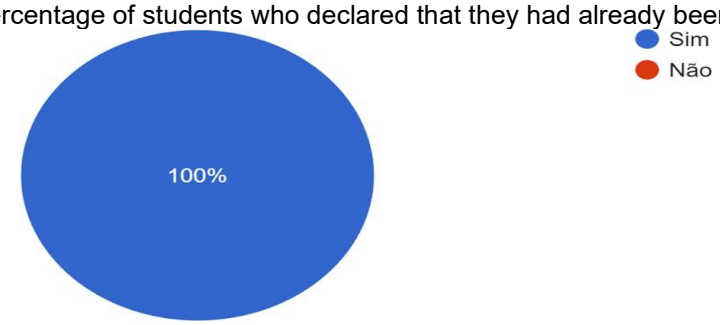
STUDENTS	ANSWERS
E1	Yes, because health is a right for everyone and access to reliable information contributes to a healthier collective (especially in relation to vaccines).
E2	It is important to avoid thoughts that vaccine is something negative.
E3	It is important for the collective health of the population and the well-being of citizens.
E4	It is important to address this issue in schools, so that children and young people understand from an early age the importance of vaccines in preventing diseases.
E5	Because vaccines play a very important role in preventing and combating pathologies.
E6	There are many people uninformed about the effectiveness of the vaccine, which makes them create unnecessary and unfounded suspicions.
E7	It is a very necessary subject, since some people think that vaccination is ineffective.

Source: Authorship, 2024.

After analyzing the students' responses, it was observed that in general they believe it is important to bring the topic of vaccines in depth at school. According to Pereira and Souza (2023), the vaccine theme has a public proportion, and its approach in Science Teaching is fundamental, as it highlights several other subjects from different perspectives that are inserted in the daily lives of students, in addition, the authors point out that addressing such a theme develops the students' ability to argue in the face of problematizations in a critical way regarding this theme.

In the twelfth question, the students were asked if they had already been vaccinated, and 100% of them answered that they had already taken the vaccine (Graph 5).

Graph 5. Percentage of students who declared that they had already been vaccinated.



Source: Authorship, 2024.

In the thirteenth question, the students who answered "yes" in the previous question should inform which vaccines they had taken. The students were numbered as E1, E2 and so on. After analyzing the results, it was found that 2 students did not provide information about the vaccines taken, resulting in a total of 26 valid answers. These answers are detailed in Chart 3.

Table 3. Distribution of students' responses regarding the type of vaccine received.

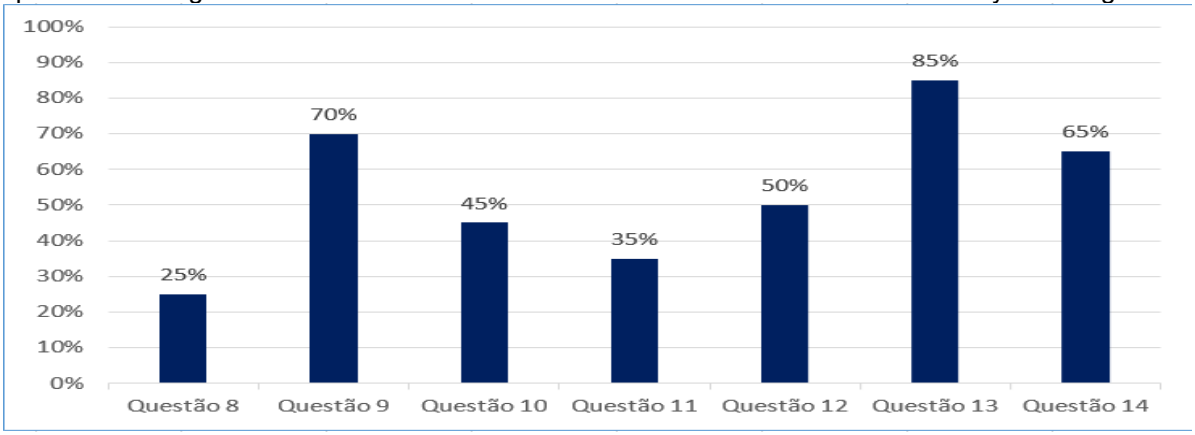
E1: those who have to take basic ones such as hepatitis, flu, yellow fever etc and covid.	**E2: Basically all of the vaccination schedule until the age of 15 (from 16 I don't know).**	**E3: All of them until 16 years old.**	**E4: All so far.**
E5: All that are allowed.	**E6: Beta hcg, viral riplice, measles.**	**E7: Pfizer, Bcg, hepatite B.**	**E8: Measles, flu, dengue, tetravalent, covid, tetanus and etc.**
E9: Flu.	**E10: I only remember Covid-19**	**E11: All (Bcg, MMR, HPV...)**	**E12: Various**
E13: All of the Little card	**E14: Flu, bitter fever, Pfizer...**	**E15: Pfizer, the influenza**	**E16: Pfizer, flu, yellow fever**
E17: influenza, HPV, Tetanus, BCG	**E18: Covid 19, CG, Trípice viral, HPV, Meningitis, tetravalent, poliomyelitis and others**	**E19: Sarampo, HIV, gripe, etc.**	**E20: there were several**
E21: Flu.	**E22: Covid, yellow fever, BCG, etc.**	**E23: All up to 16 years old.**	**E24: From the flu.**
E25: Pfizer, flu vaccine, anti-tetanus.	**E26: Covid-19, tetravalent and gripe.**	**E27: did not answer**	**E28:He did not answer.**

Source: Authorship, 2024.

When analyzing the results of chart 3, it was observed that most of the students participating in the research took more than one type of vaccine. According to Taschner and Almeida (2023), vaccines represent one of the most effective intervention measures in public health for the prevention of infectious diseases. The authors emphasize that vaccination is a right guaranteed by law for children and adolescents, evidencing the importance of this practice in the promotion of individual and collective health.

With regard to the kahoot-exclusive questions, the results obtained can be seen in graph 6.

Graph 6. Percentage of correct answers in the kahoot of students in class C of the 3rd year of high school.



Source: Authorship, 2024

The eighth question asked " In which year was the first vaccine discovered? " He brought four alternatives: "1900", "2020", "1893" and "1796". After analyzing the result, it was found that only 25% of the participants marked the correct alternative (Graph 6). According to the Butantan institute website (2021), the first vaccine was discovered in 1796.

The ninth question asked students who had been the scholar who discovered the first vaccine. In the alternatives there were "Edward Jenner", "Albert Einstein", "Gregor Mendel" and "Dalton", in this question, 70% of the students got it right (Graph 6). The world's first vaccine was discovered by the English physician Edward Jenner in 1796 during his studies on smallpox (Ayres; Travassos; Sampaio, 2023).

The tenth question asked "The adaptive immune system is formed by which cells that act together in order to detect and eliminate invaders?" The four alternatives contained "Neutrophils and blood cells", "B and T lymphocytes", "Antibodies and B lymphocytes" and "Antibodies and T lymphocytes". The percentage of correct answers was 45% (Graph 6). The immune system protects the body against diseases through biological structures and processes, and uses specific molecular mechanisms coordinated by cells, such as

lymphocytes. Acquired immunity has the function of conferring immunological memory to T and B lymphocytes (Costa *et al.,* 2020).

The eleventh question asked, "Which alternative below presents the correct definition of what antibodies are?" He brought the four alternatives "Protein that signals our body when something is wrong", "Carbohydrate that signals the nerves about possible brain attack", "Immunological substances that induce the immune system to produce antigens" and "They are veins linked to the heart". In this question, 35% of correct answers were correct (Graph 6). According to the website of the Oswaldo Cruz Foundation (Bio-Manguinhos/Fiocruz), antibodies are proteins that help the body fight pathogens such as; viruses, bacteria, fungi and parasites, from recognition through antigens. Almeida, Lameke and Figuerôa (2023) state that vaccines are effective and safe to protect the body against diseases, as vaccines stimulate the body's defense, based on specific antibodies.

The twelfth question asked "About the composition of the vaccine, what is the correct alternative?" And the alternatives were: "In the composition of the vaccine we have: water, sodium and sulfur", "The vaccine is composed of inactive fragments of a certain pathogen", "It contains the microorganism activated in a lethal way" and "The vaccine contains part of the DNA of the virus that is sought to be targeted". It was found that in this question the correct answers were 50% (Graph 6). To compose the vaccine, it is necessary to have a fragment of the infectious agent, live attenuated, dead or inactivated microorganisms, toxoids or subunits. In addition, stabilizers, preservatives, antibiotics, and residual proteins are added to the composition of the vaccine (Pinheiro, 2020).

The thirteenth question asked the students "Which of the alternatives below DOES NOT contain correct information about vaccines for public health" the alternatives were: "They enable the global control of infectious diseases", "They do not offer quality of life, as they have more harm than benefits", "The Federal Government's vaccination schedule managed to eradicate smallpox" and "They are offered free of charge and safely by the Unified Health System". In total, there were 85% of correct answers on this question (Graph 6). According to Araújo *et al.* (2022) vaccination is important for public health, as it is an effective means of promoting health while minimizing infectious diseases. Gugel *et al*. (2021) highlight that the Brazilian National Immunization Program (PNI) in 1973 was of great importance in public health, because through it, it was possible to eradicate several diseases in the country such as polio and smallpox.

The Unified Health System (SUS), created in 1988, is composed of the Ministry of Health. The implementation of the SUS in Brazil aimed at health promotion and prevention as a right for all in a safe way (Barros *et al.,* 2021).

Belchior *et al. (*2023) highlight that the vaccine is an essential resource for quality of life, as it prevents against several diseases. In line with Souza *et al*. (2022) state that vaccination has many benefits for the lives of individuals. Thus, it can be stated that the alternatives "They do not offer quality of life, because they have more harm than good" of the thirteenth question was the incorrect one.

The fourteenth question, the question was "Which body is responsible for inspecting and approving the quality of vaccines before they are offered to the population" the alternatives were: "National Health Surveillance Agency (ANVISA)", "Unified Health System (SUS)", "Department of Education" and "None of the alternatives". The number of correct answers was 65% in this question. The National Health Surveillance Agency (ANVISA) is a regulatory agency responsible for evaluating and proving the quality, efficacy, and safety of vaccines (Brasil, 2023).

At the end of the general analysis of the results obtained in Kahoot, it was found that the total percentage of correct answers of 3rd year students in the game was 66%.

FINAL CONSIDERATIONS

The pedagogical approach was satisfactory, as it allowed the participating students to interact with the theme while learning in a playful way about a complex and important subject for public health.

The use of the survey questionnaire as a methodological procedure allowed us to investigate the previous knowledge of the students who participated in the research. The quiz on the Kahoot app on the theme "Vaccine" in the biology discipline allowed us to work in a playful way with 3rd year students, reinforcing the subjects covered in the lecture.

From the analysis of the results obtained after the intervention carried out at the school, it was found that time and competition are antagonists in the students' performance, even though the subsequent results, in general, were significant.

The methodology used allowed that, despite the challenges proposed by the quiz, the students interacted positively with the approach. This contributed significantly to the understanding of the contents covered and was effective in building the relationship between teaching and learning.

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