QUISCIENTIST: A PLAYFUL PROPOSAL FOR THE TEACHING OF CHEMISTRY

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Jordan Lima Braga[1], Marília Sobral Souza[2], Wildson Max Barbosa da Silva[3] and Solange de Oliveira Pinheiro[4].

ABSTRACT

Didactic games are playful proposals that favor the collective construction of knowledge, dynamizing and improving the focus of students during classes. It should be noted that these activities aim at the same time to motivate, generate pleasure and stimulate development. In this perspective, the present work aims to develop the QuiScientist game as a playful proposal for the teaching of Chemistry. The game consists of an adaptation of the "game of three clues", containing cards that address the main scientists of three thematic axes of Chemistry: Atomic Models, Periodic Table and Women in Science. In short, the chapter proposes, through the elaboration of the QuiScientist game, a reflection on the subjects of Chemistry and the paths for a more dynamic and effective teaching. Thus, it seeks that its application enables students to learn more pleasurably, interactively, and effectively, capable of arousing interest and curiosity about Chemistry contents.

Keywords: Scientist. Game of the three clues. Playful Proposal. Chemistry Teaching.

[1] Degree in Chemistry
State University of Ceará – UECE
[2] Degree in Chemistry
State University of Ceará – UECE
[3] Dr. in Biotechnology
Vale do Acaraú State University – UVA
[4] Dr. in Inorganic Chemistry
State University of Ceará – UECE

INTRODUCTION

Teaching and learning have existed since when human beings used the non-verbal form of writing to leave messages on the walls of caves, with the aim of transmitting information to others (FONTENELE, 2013). In this way, over time, teaching was modernized until the construction of environments, that is, classrooms with blackboards and teachers. According to Paulo Freire (1996, p. 15) in his work Pedagogy of Autonomy, "the impossibility of becoming a critical teacher if, mechanically memorizing, he is much more a cadenced repeater of inert phrases and ideas than a challenger". In this context, teachers who do not provoke the construction of knowledge in partnership with students are educators of future professionals who do not think critically, corroborating the repetition of ideas that were previously provided to them.

Therefore, this teaching method aims to create an authority figure in the classroom and this causes a barrier between the teacher and the student, as the student does not actively participate in the class, making observations and contributing to the construction of knowledge in an active and collective way (LOVATO et al., 2018). It should be noted that Chemistry is a discipline in the area of Natural Sciences, which for some time was restricted to traditional methods, using some strategies centered on the memorization of formulas, calculations, to fix the content, making Chemistry something even more abstract (AFONSO et al., 2018). In this way, the introduction of playfulness in the teaching of Chemistry facilitates the assimilation of the contents, contributing to make it more attractive (MARTINS; CAVALCANTI, 2023).

Thus, didactic games are an alternative to increase students' interest in the contents seen in the classroom, causing an interaction between teacher and student, so that they are stimulated to build knowledge together with the teacher (CUNHA, 2012). In addition, games and playful activities are proven to be allies in the teaching and learning process, because in addition to making classes more dynamic, they increase students' focus and thus provide group work, generating moments of relaxation (BENEDETTI FILHO et al., 2021).

Games, according to Piaget (1978), are activities that aim to motivate, generate pleasure and stimulate development at the same time. These activities can be classified into three main categories: Simple Exercise Games, Symbolic Games, and Rules Games.

Simple exercise games are based on activities in which the individual needs to use repetition as a way of learning and improving their sensory-motor skills. In symbolic games that can also be called "make-believe" games, those in which the individual needs to manipulate his imagination, in order to build situations that provide him with fun, through the

modification of reality (MATTOS; FARIA, 2011). In turn, rule games are playful activities that require instructions to be followed, called rules of the game, and stimulate the creation of a competition among the participants, making a junction between sensory-motor or intellectual skills (RIBEIRO; CASTRO; LUSTOSA, 2018).

Thus, considering that the rule games are presented as important playful activities, they also help in the development and concentration of the participants, the present work brings a playful teaching proposal through a rereading of the game of the three clues, presenting new rules as an attempt to reproduce it for insertion in the classroom within the scope of the Chemistry disciplines. The game aims to assist the teaching-learning process of the subjects covered in the classroom with regard to the association of scientists with their inventions and theories. Based on these assumptions, this chapter reinforces the importance of playfulness within the classroom through games as a complement to the approach and assimilation of theoretical content, to become an aid in the learning and development of the student.

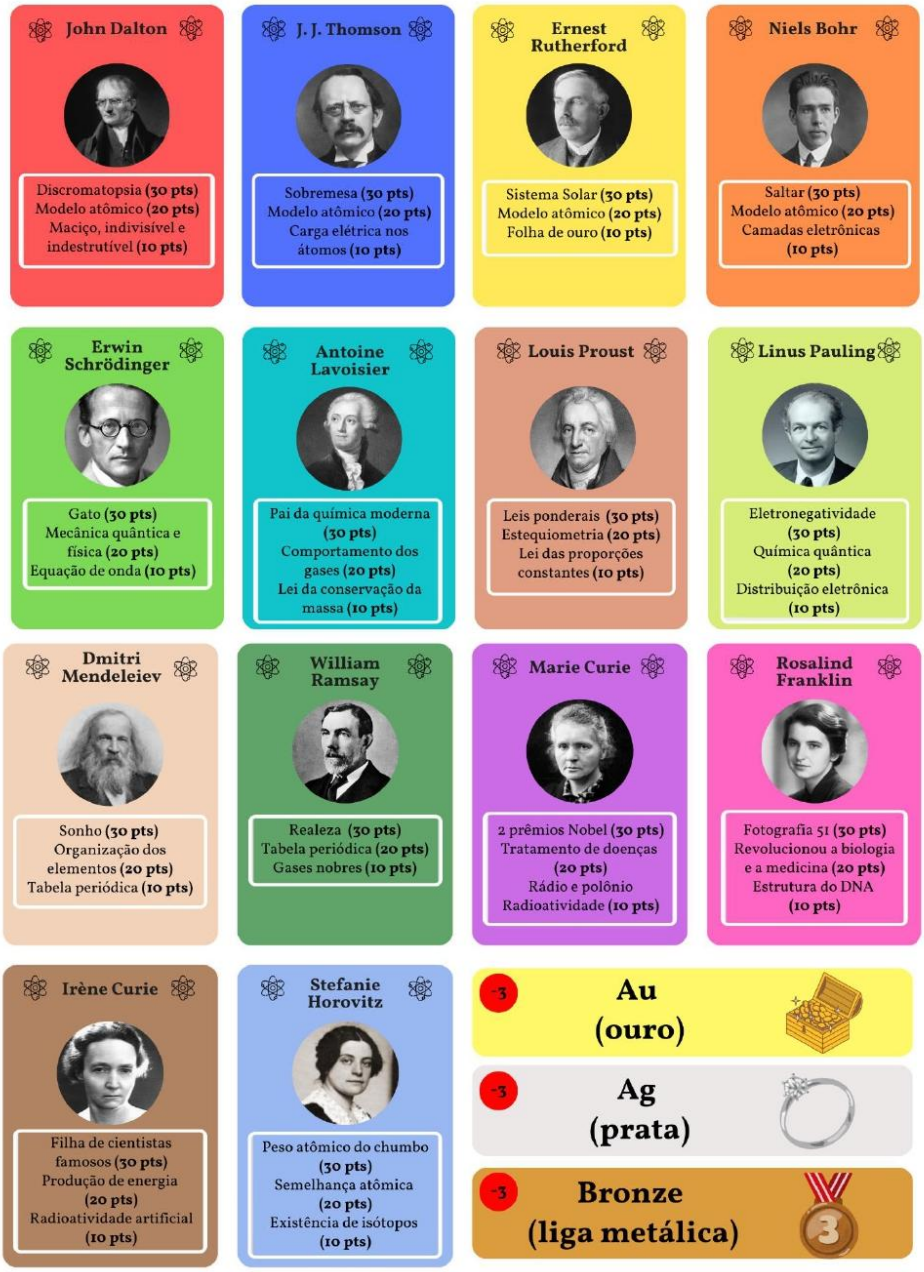
DEVELOPMENT

The game is an adaptation of the "three-track game" and comes with the goal of learning and knowledge about the leading scientists who appear in the history of Chemistry. For this, hints and clues are used, so that students can guess and guess which scientist they are referring to, thus being able to have fun teaching the content through an interactive way. The proposed game is called QuiCientista and addresses some important scientists within the area of Chemistry through illustrative letters, seeking interaction with the contents in relation to the thematic axes and in line with the contents of High School.

The game cards address three main themes: Atomic Models, the Periodic Table, and Women in Science. The letters on atomic models have scientists such as John Dalton, Joseph John Thomson, Ernest Rutherford, Niels Bohr and Erwin Schrödinger who contributed to the evolution of atomic models, with perspectives on the nature of atoms and their properties. The letters on the Periodic Table feature the scientists Dmitri Mendeleev, Linus Pauling, William Ramsay, Antoine Lavoisier, and Louis Proust who were responsible for the elaboration of the Periodic Table and for information related to the characteristics and chemical properties of the elements. The Women in Science letters bring notable women scientists to the progress of science such as Marie Curie, Rosalind Franklin, Stefanie Horovitz and Irène Joliot-Curie who faced academic, cultural and social obstacles. 14 (fourteen) illustrative cards were produced with photos, names of the scientists

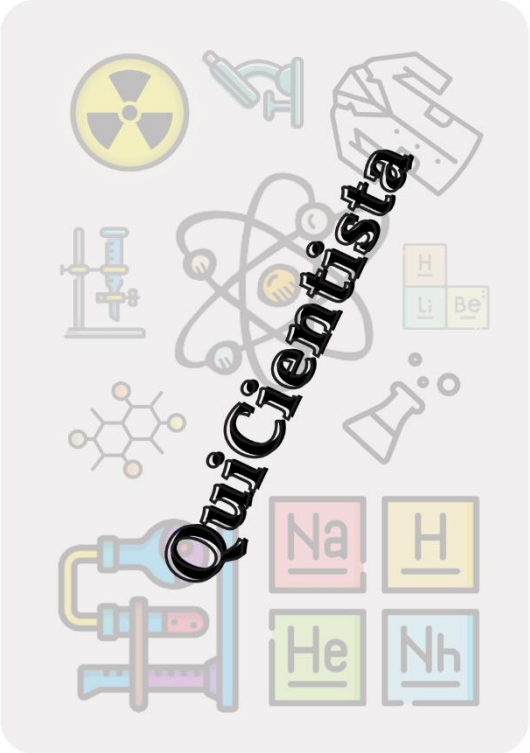
containing tips related to curiosities, impact and discovery and 3 (three) bonus cards (Figure 01). On the back of the card is the name of the game (Figure 02).

Figure 01 – Representation of the cards of the QuiScientist game, front part.



Source: Prepared by the authors.

Figure 02 – Representation of the back of the cards of the QuiScientist game.



Source: Prepared by the authors.

GAME RULES

– A moderator is needed to establish the rules, read the hints and write down the score.

– For the criteria of organizing the points, it is important that the moderator in each round write down the respective selected scientist, in which tip the team scored and what the score was.

– At the beginning of the game, the cards should be shuffled and placed on the table so that the clues are not visible to the players. The room should be divided into 2 teams and regardless of the number of students, the game makes it possible to test individual knowledge (bringing the responsibility of winning or losing the round with your knowledge) and at the same time test the sense of collectivity through the "Au card - gold", "Ag card - silver" and "bronze card - metal alloy". These three cards are a bonus that the member can activate to ask their team for help to answer the round. Each team is entitled to these three cards, that is, ask for help from their team three times during the game.

– A draw is held to find out which team will start, so the team member who has priority in the round, chooses a card and gives it to the moderator who will read the first tip, which is worth 30 points and thus will ask QuiScientist?. If the player answers correctly, the team earns the points. If you answer wrong, the moderator asks: "Golden Chart" or passes

the round? If the player chooses the bonus card, he can ask for help for his team. Answering correctly will take the score minus 3 points (because when using the card it brings the inconvenience of losing 3 points from the main score) if even with the help of the card they answer wrong, the points of the round automatically pass to the opposing team. If the player chooses not to use the card, the round passes to the opposing team and the second hint is read (which is worth 20 points), if the team gets it right it takes the points and because it does not have priority in the round it does not have the right to a bonus card. Getting it right takes the 20 points, getting it wrong, it goes back to the team that has priority and the last tip is read. Coming to this third and final tip, if the player on the team gets it right takes the 10 points, if he gets the last one wrong without using the bonus card the points for the round are lost and the points for the round pass to the other team and the scientist is revealed by the moderator. In addition, if the team of the priority of the round still has a bonus card, it can use it, if it makes a mistake even with help, the points of the round pass to the other team and the scientist is revealed by the moderator.

– BONUS CARD RULE: Only the team that has priority in the play, that is, the team that started the round, is entitled to trigger the bonus card. The first is the "Au - gold card", the second is the "Ag - silver card" and the third is the "bronze - metal alloy card". The "bonus card" can be triggered 3 times by each team during the game, but only once in each round. It gives the participant the right to ask for help from his team to answer the tip. Because it is a great help, it will bring the inconvenience of losing 3 points of the score you would gain, for example if it is triggered in the first hint the score will be worth 27 points (30 minus 3), if it is in the second hint 17 points (20 minus 3) and if it is in the last hint, 7 points (10 minus 3).

– Each team can establish the strategy of which member starts, not being able to repeat the participation in the individual rounds. Regardless of the number of students, it is important that each team organizes a queue for the participation of its members in the rounds.

– ROUND PRIORITY RULE: each team has the right to start the round by alternating priority. Example: If team A started round 1, the next round starts is team B. Regardless of who wins the round, the order of priority must be respected and the teams must intersperse this priority of starting the round throughout the game. Thus, everyone has the possibility to score the highest score equally.

– At the end of the game, the teams' points are awarded, and the team that accumulates the highest score wins the game. The winning team may receive a bonus as an extra score in the discipline. In this sense, the sense of responsibility in seeking to

respond correctly rises in the face of collective achievement, each one contributes to the victory of all.

MAKING OF THE CARDS

The QuiScientist game cards were made in Canva®, a versatile tool that allows the creation of several educational games. The assembly was developed using graphic elements and free fonts, for the making of the letters and for the logo that is located on the back. It should be noted that the content present in the letters may vary according to the material explained in the classroom. The images used were selected through the Google Images search page. The prints of the cards can be made by downloading the images obtained by Canva® and the printing can be done on high weight A4 colored paper for better quality during the application of the game in the classroom.

PERSPECTIVES OF THE APPLICATION OF THE GAME

Chemistry is a Science that needs a foundation based on experiments, simulations and mathematical calculations, as they help in the understanding of the contents. However, high complexity often favors difficult understanding, making it necessary to use an appropriate language, contextualized and supported by appropriate tools. Thus, games have great potential for application in the educational field, due to autonomy, curiosity, reasoning, collectivity, empathy and stimulated problem solving (NANQUE; JUNIOR; COLARES, 2024).

The future application of the QuiCientista game intends to instigate the collectivity and knowledge of all the content of the game by each of the members. The fact that the card is chosen randomly makes each team member try to study to earn the maximum points in their turn to participate, thus trying not to make mistakes so as not to harm themselves and the team. The three bonus cards aim to directly stimulate this collectivity with the possibility of helping a member with difficulty in responding. In addition, each team establishes the strategies they deem necessary in the order of their participants.

However, didactic games are important tools for the student to overcome barriers in learning, corroborating the fixation of the content. From this perspective, the game can help to improve a critical view, because during its application, the student will be able to understand and relate the contents previously seen in the classroom (SILVA et al., 2017).

Therefore, the importance of the presence of the teacher is highlighted, who will act as a conductor, stimulator and evaluator of the learning of the game. This must clearly define which activities to be carried out before, during and after the end of the game. Since

these definitions need to be clear, for the game to play the playful proposal and thus enable the evaluation of knowledge and the cognitive development of students. Otherwise, the application of the game may be limited to a simple moment of fun and entertainment in the classroom, without achieving its main objective (CUNHA, 2012). Therefore, the elaboration of this didactic material proposes a didactic game through the adaptation of the game of the three clues, inserting it in the discipline of Chemistry, with the perspective of contributing to the development of students in relation to the content on Atomic Models, Periodic Table and Women in Science.

FINAL CONSIDERATIONS

The elaboration of the game QuiScientist is a proposal to approach the playfulness of rule games. In this way, its future application aims to evaluate students in the classroom and thus obtain positive or negative considerations about the game. It is worth noting that the game was formulated with the perspective of increasing interest and facilitating the students' understanding of certain contents in the discipline of Chemistry.

It is highlighted that the application of the game can influence a better development of sensory and cognitive skills, aiming at the interaction between teacher and student and the construction of knowledge in a collective way. Thus, this approach minimizes the creation of a barrier between teachers and students, generating a comfortable environment for exchanging knowledge and solving doubts.

However, rules games play a fundamental role, especially when they are based on the accumulation of points according to the correct answers. This method helps students to better reflect on the quality of the answers provided by them, also increasing focus and concentration during the previous explanation of the contents.

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