Modern Board Games as a Proposal for Teaching Physics with a Focus on Science,Technology and Society (STS)

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Abstract

For improve the teaching and learning process is necessary thinking in ways to promote the construction of knowledge and conscious teaching about the world we live in. Therefore, this work aims to present a proposal for teaching Physics using Modern Board Games with a focus on Science, Technology and Society through Investigative Teaching. This tool presents itself as a possibility to work on the content in a playful way and focused on building knowledge based on the simulation of a real problem present in the lives of students. As an examples, this work also presents the game Coleta Certa, like Radioactive Waste Collection, about radioactive waste and the concept of half-life for radioactive decay, and the game Se Liga, like Be Aware, about the concept of electrical energy and the conscious consumption of electrical energy at home, also presenting an autoethnographic analysis results of the development of these games.

CCS Concepts

• **Applied computing**; • **Education**;

Keywords

Modern Board Game, Physics Teaching, STS

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1 INTRODUCTION

The classroom is a space designed for student learning, with the teacher as the main mediator of this process [1]. However, the way in which this learning should occur has been the subject of discussion over the years, due to concerns regarding the role of students in the society in which they live, where there are constant transformations due to technological evolution [2]. Therefore, there is an incessant search for ways that can help students learn, through the mediation of the teacher, thinking about their reality and the possibilities of implementation in classrooms. The concern in carrying out this research opens doors to increasingly different ideas that can be used, which encourages teachers to reflect on choices regarding what is best for each reality.

Thus, this work aims to show a possibility of a Physics teaching tool that can assist in the learning process based on the playful interaction of students and in the construction of knowledge based on a reflection and connection between the world in which they live and the proposed content. This teaching tool is the Modern Board Game with a focus on Science, Technology and Society (STS) for Investigative Physics Teaching. From the next topics, more will be presented about what each fragment of what this tool proposes represents, in addition to explaining two examples of games that contemplate these characteristics, the "Coleta Certa" game, like a Correct Waste Collection, developed with the purpose of discussing the problems related to radioactive waste, the importance of the use of nuclear energy in our society and the concept of half-life for radioactive decay [3] and the "Se Liga" game, like Be Aware, developed to work on the concept of electrical energy and discuss the conscious consumption of electrical energy.

2 TEACHING WITH A FOCUS ON SCIENCE, TECHNOLOGY AND SOCIETY (STS)

Physics content can be approached in different ways, the most common being focused on the curriculum itself, and based on this curriculum, how to create a situation that makes students understand a certain subject [4]. However, if we reflect on the purpose of teaching a given subject in Physics, it makes no sense to prioritize the content when planning a class. Following this line of reasoning through an example, we have the concept of average speed, which can only be taught directly, with its basic definition and equation. However, when the teacher reflects on why students should learn about the concept of average speed and the possible relations with their daily lives can provide with an opportunity to them to understanding the concept of average speed in relation with problems and situations that may arise in their lives and that having that knowledge can help them in their decisions-making.

Therefore, the teaching proposal with a focus on STS emerged around 1980, by researchers concerned with teaching the concepts of Natural Sciences with the main objective of helping in the citizenship formation of students, in order to enable them to better understand the world and live based on the knowledge acquired at school [5]. In other words, knowledge of Physics, when considered in terms of applicability, should not only be planned for technical and professional training, but for the entire population, which lives in a world full of needs that involve knowledge of Physics. According to Aikenhead [6] in a STS curriculum, canonical scientific content is related to and integrated with the students' everyday

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world in such a way that it mirrors the students' natural efforts to make sense of that world.

Teaching in a way that is contextualized with the world is also described in the Brazilian document that serves as the basis for the formation of curricula in schools, the National Common Curricular Base [7] which states that schools must build their curricula and pedagogical proposals, considering the characteristics of their region, local cultures, training needs and the demands and aspirations of students.

One way to connect content with society and the technologies that shape it, in order to simulate reality, is through Investigative Teaching, where students are asked to solve real or near-real problems and, through the search for solutions to these problems, students learn. This method places the student in the role of protagonist in the learning process, through the guidance of the teacher [8].

Therefore, investigative teaching is a way of directing students to build their thinking based on interactions between them, favoring an exchange of information between peers, based on their prior knowledge of the world so that together they can build new knowledge about a phenomenon that is being analyzed, favoring the development of various cognitive and psychological skills due to this interaction.

Games, especially those classified as Modern Board Games, in addition to being able to simulate a real problem for students to seek a solution, can provide paths based on rules that make this search possible to build knowledge about a certain content.

3 GAME-BASED LEARNING

When we think about the definition of a game, some words come to mind, such as fantasy, challenge, rules, competition and fun. According to Huizinga [9], in his work "Homo Ludens", the characteristic of a game is intrinsic to human beings and predates culture, because according to the author, world building and human relationships occur through the natural instinct of living beings to play. So, a game can be interpreted as a simulation of reality, with the objective of overcoming challenges, respecting certain rules, competing with other people who have the same goal and having fun throughout the process. Furthermore, games allow for immersion that motivates the player to live the proposed experience [10, 11].

The definition of game described is already linked to the possibility of learning occurring during the gaming experience. Therefore, there is game-based learning, where the focus goes beyond fun, but on generating the possibility of using games (Serious Games) or game tools (Gamification) to teach content and develop skills. Therefore, serious games are planned and applied with the main focus of enabling a relationship with something real, games used in training, political issues, management and health promotion. Therefore, serious games are designed or used to go beyond fun, for a real application purpose, the serious purpose [12].

Huzinga [9], makes several connections with games. One of these connections the author makes is between games and knowledge, in which he says that in a competition the decision can be made by luck, physical strength, dexterity or armed combat. There can also be competitions of courage and endurance, skill, knowledge, bravado or cunning. In other words, a game can be used for different purposes, from the moment it is defined what will be necessary for the player to use to make decisions in the search for victory.

According to Hunicke, Leblanc and Zubek [13], in the process of developing games, it is necessary to see the player's perspective of the game and from the perspective of the experience that is desired for players, it is possible to incorporate challenges, narratives, fantasies and discoveries with dynamics associated with real situations and establish them through mechanics that can be worked into the game. Thus, serious games can be designed or used so that in the search for victory, students are encouraged to think of solutions that involve specific knowledge, whether related to Physics content or another discipline.

One of the formal characteristics of any game, second Huzinga [9] is that it has a specific place to be idealized, which he calls a "magic circle", where the story and rules proposed by the game are valid, generating a fictitious scenario and narrative that can simulate real problems and solutions can be tested according to the established rules. The other formal characteristic of the game, according to Huizinga [9], is the fact that the player is immersed in a parallel and fictional reality, created by the game, making him a character while he is present in that reality.

This characteristic is very important for the player to represent a character capable of solving problems that in real life would have real consequences and risks that do not exist in the game, but that can generate possible solutions applicable in society.

Therefore, working with games is fully aligned with the teaching proposal with a focus on STS, as the game can be designed to simulate a social problem, encouraging the student's participation in discussions relevant to their reality in an interactive and investigative way.

The investigative way proposal associates the learning process with the construction of knowledge based on students' active search. From this perspective, games offer mechanisms that favor students' active participation and the development of various skills during the gaming experience [11]. This interaction, in addition to promoting learning, is important for promoting the development of cognitive and psychological skills during active and interactive participation in the game, such as memory, problem-solving, creativity and empathy [11, 14].

However, there are several types of games, with different characteristics, and the game that has the characteristics that best intersect with the teaching proposal with a focus on STS and investigation are Modern Board Games.

4 MODERN BOARD GAMES

There are several types of games that can be used for teaching purposes, and they can be analog and/or digital. Analog games can be represented by cards, board games, dice, RPG (Role-Playing Game), etc. Digital games can appear on computers, television consoles, portable devices, in applications for smartphones, etc [15].

Using Bernardes' classification [16] for board games, there are classic, traditional and modern games. Classic board games were created thousands of years ago, as they were games built from basic manufacturing, which was what was possible at that time.

Chess, Checkers, and Mancala are some examples of classic games. Traditional board games began to emerge in the mid-19th century, such as "Monopoly" [17] and "Game of Life" [18]. These games are mainly made up of boards, cards, and dice, and their operation is based on following trails filled with challenges and commands, with the goal of making players reach the end.

The Modern Board Game is a classification of analog table games that emerged in the 1990s, after the popularity and sales of traditional games decreased, due to the emergence of digital games, with "Catan" [19] and "Carcassonne" [20] being some of the precursors of this new era of board games [16].

Analog games, in general, have an advantage over digital games because they allow interaction between players and the game itself, as analog games require greater knowledge and control of the game's mechanisms, since players are responsible for handling the pieces throughout the process [21, 22].

According to Hünemöorder et al. [23], modern board games differ from others due to their complexity, which favors the knowledge construction process. Therefore, these games can be used as a teaching tool because they allow content to be learned during the game in an investigative manner, that is, with the construction of the student's knowledge based on their experience during the game. Furthermore, according to Prado [24], the emergence of Modern Board Games made it possible to create new ways of playing, with the possibility of games emerging that do not depend solely on luck and that can simulate different situations from our daily lives.

Two Modern Board Games will be presented, designed with the aim of teaching Physics concepts with a focus on Science, Technology and Society: Coleta Certa (Correct Waste Collection) and Se Liga (Be Aware).

4.1 COLETA CERTA GAME

An example of a game that includes this proposal is Coleta Certa, which was created with the purpose of working with the concept of half-life for radioactive decay through a simulation of a radioactive waste deposit. Half-life is the time required for half of a sample of a given chemical element to emit nuclear radiation. These chemical elements that have this capacity to emit nuclear radiation are also called radioisotopes. Each radioisotope has a different half-life, which can be in hours or even millions of years. Technetium-99m, for example, has a half-life of 6 hours and cesium-137 has a half-life of 30 years. The process of emitting nuclear radiation is called radioactive decay, which consists of a change in the atomic nucleus, making it more stable and different from what it was before the decay [25].

In Coleta Certa, the magic circle is a radioactive waste warehouse in a city that, despite the region's great development, has a serious problem with the accumulation of radioactive waste stored in lead warehouse, taking up a large amount of space. Until now, this waste was placed in the warehouse without anyone or a team to monitor when it could be removed, causing the warehouse to become increasingly full. Therefore, there is a need for a team of scientists to analyze which waste should have been collected earlier and which still needs to remain in the warehouse, for a little or much longer.

In order to solve the problem of radioactive waste accumulation, players will take on the role of hired scientists who will monitor the collection of these contaminated objects, respecting the correct time that each waste needs to stop being harmful, based on the half-life of the contaminating element and its initial radioactive activity. Therefore, the one who best organizes the waste in the correct collection time (time for it to become non-harmful to health and the environment) will be the representative of the team of scientists and will win the competition.

This game has a competitive mode, that is, everyone plays against everyone else and there is only one winner. The stages of the game are based on cards with commands, the game ends after seven rounds, the victory refers to the highest score at the end of the rounds and its mechanics (actions) are: hidden information, deck with actions and card collection. The game is for a minimum of two and a maximum of four players or groups, and the average time of a game is 1 hour and 40 minutes.

The main component of the game is the radioactive waste card, which represents the waste that arrived at the warehouse and all its characteristics. Figure 1 represents an example of a radioactive waste card.

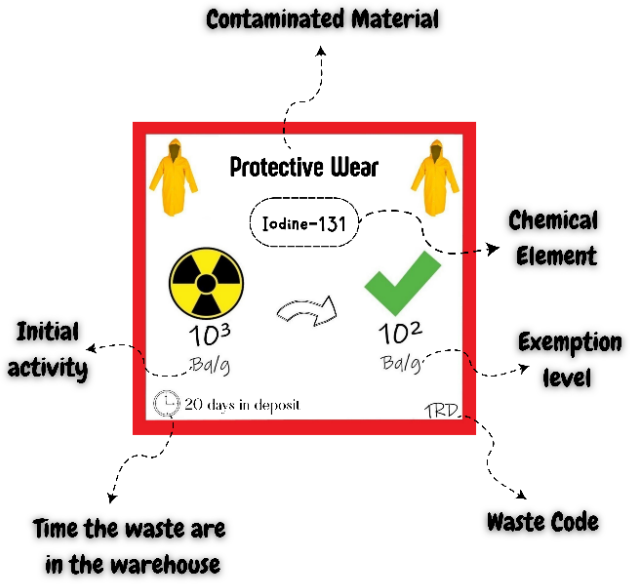

Figure 1: - Radioactive Waste Card example and explanation

From this component, it is possible to understand that the objective of the game is to find out how long each waste needs to stay in the deposit and what determines this are the initial activity and exemption level of each waste. The initial activity represents the radioactive activity in Becquerel per gram that the waste had when it arrived at the warehouse and the exemption level is the order of magnitude necessary for the value to leave the warehouse. When checking this time, it is necessary to take into account the time that the waste has been in the warehouse to make the subtraction and

conclude what is the remaining time that the waste needs to leave the warehouse.

The code in the right corner is used to relate the radioactive waste card to the research cards and to identify them on the scoring sheet at the end of the game. All cards have a number and an abbreviation, which represents the place of origin of the waste. Figure 2 shows the abbreviations.

RD	Radiodiagnosis
RT	Radiotherapy
IN	Industry
AG	Agriculture
NP	Nuclear Power Plant

Figure 2: - Abbreviations for the codes

The component that makes it possible to discover the time required for the initial radioactive activity to decay to the order of magnitude of the exemption level is the research card. Figure 3 shows an example of the research cards present in the game.

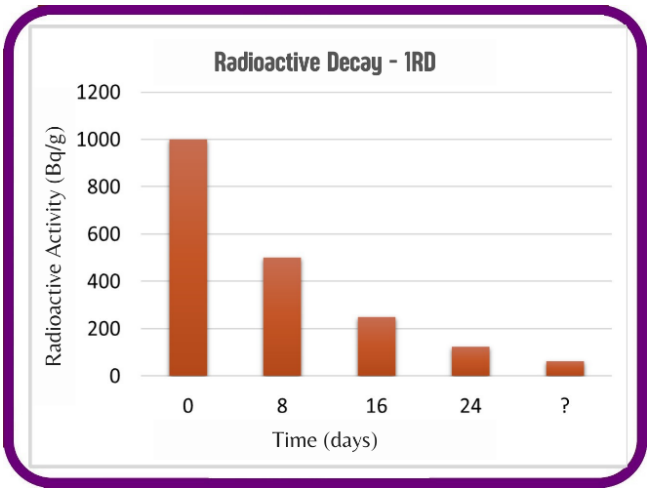

Figure 3: - Research Card example

This research card refers to the same radioactive waste card that was presented as an example, since its code is also 1RD. The question mark on the last decay bar serves as a puzzle for players to realize that there is the same time interval for each decay, making it possible to arrive at the value that should be in the question mark and thus discover more about the concept of half-life.

In addition to these two components, there are Waste boxes, which are very important for organizing radioactive waste cards after analysis during the game. Figure 4 shows the two boxes with 3 spaces each that each player receives to organize their radioactive waste cards.

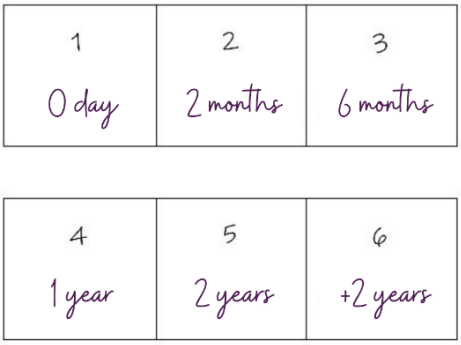

Figure 4: - Waste Boxes

After analyzing the radioactive waste card, it should be placed in the space with the closest and highest time in the waste box. If, after analysis, it is found that the waste has been in warehouse longer than it should, it should be placed in box 1 (0 day), as it can be removed from the warehouse immediately.

At the end of the game, each player's score is determined from the waste box. When the radioactive waste card is placed in the correct place, the player earns 10 points. When the radioactive waste card is placed in the space before the correct one, it means that he is contributing to the exposure of a waste that still emits harmful radiation and he loses 1 point. And if the player places the radioactive waste card in a space after the correct one, he neither gains nor loses points because, despite not contributing to environmental contamination, he is organizing the waste incorrectly and favoring the accumulation of radioactive waste in the warehouse.

In addition to these components, there are others that serve as support for analyzing the cards and organizing the game. There are tip cards, which explain the relationship between the radioisotopes, their half-lives and their use in each location present in the game. At the end of each card, there is a tip about the two possible spaces where the waste contaminated with that radioisotope can be placed, reducing the options from six to two and helping with the organization of the cards. Figure 5 shows an example of a tip card.

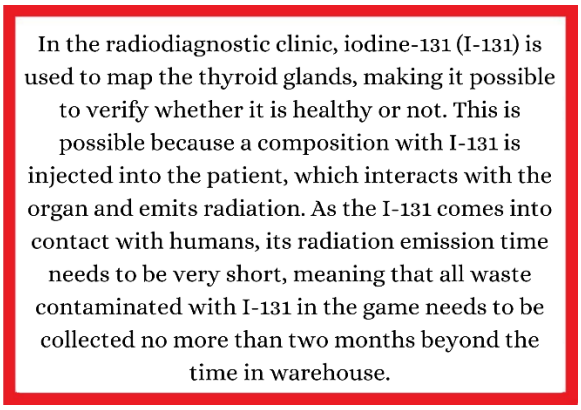

Figure 5: - Tip Card example

There are also 5 boards, each of which represents the place where the waste comes from, making it easier to see during the game. To make things easier for players before the game or match begins, a research card and a tip card are given to each player so that they can start analyzing the game cards and understand how it works before they start making their choices.

Finally, there are the cards that make the game work, which are the permission cards, which determine the possible actions, which consist only of buying the components necessary to analyze the radioactive waste cards and the research cards themselves. In Figure 6 there are the four and quantity of each, closing a small deck of seven cards, which are given to each player.

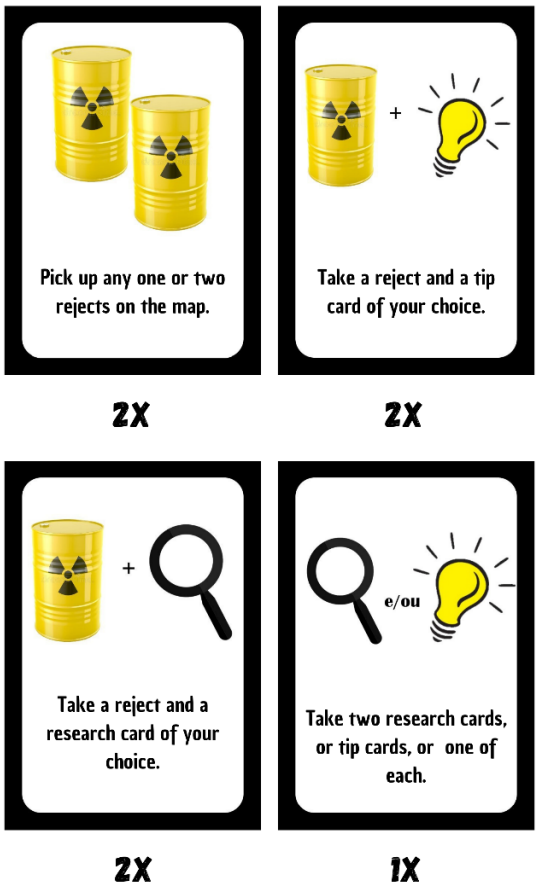

Figure 6: - Permission Cards

Once the game is set up and all players have received their starting components, the game begins. Each player takes a turn choosing a permission card and doing what it asks. Once all players have finished performing their actions, the round ends and a new one begins, where players must make new choices.

The game ends after 7 rounds, that is, when all permission cards have been played. After the game is over and everyone has finished their analysis, a scoring table is given to the players so they can count their points. A portion of the table is shown in Table 1.

Table 1: – Score Table with some examples

Codes	11D	22m	36m	41y	52y	6+2y
1RD	10	0	0	0	0	0
2NP	-1	-1	-1	-1	-1	10
3^{RD}	-1	10	0	0	0	0
4AG	-1	10	0	0	0	0
5NP	-1	-1	-1	-1	-1	10
6RD	10	0	0	0	0	0

Figure 7 shows all game components and their organization.

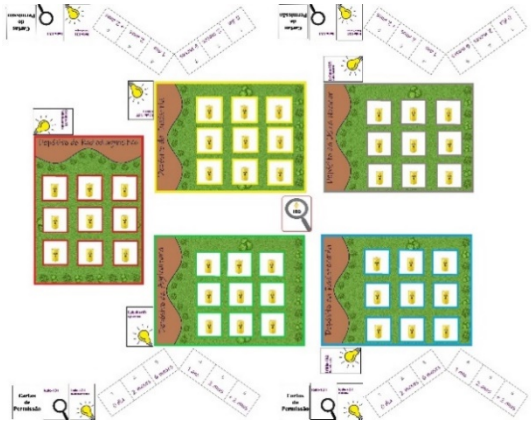

Figure 7: - Components and Organization of Coleta Certa game

This game has already been used with undergraduate physics students [3] and secondary school teachers [26] and has proven to be an attractive proposal that encourages the construction of knowledge and reflection on issues involving nuclear energy.

Therefore, through the Coleta Certa game, students are invited to reflect on the importance of the use of nuclear radiation sources in our society, in addition to nuclear power plants and medicine, the risks involved in their use and the necessary care with radioactive waste. Based on these issues, students need to work with the decay time of nuclear radiation sources, leading to the construction of knowledge about the half-life for radioactive decay.

4.2 Se Liga Game

The game, called Se Liga, aims to work on the concept of electrical energy consumption based on the electrical power of appliances and the time each one is used. The name uses a play on words that in portuguese ends up having a double meaning of "pay attention" or "be aware", and the relationship with turning on the light. According to the relationship between these quantities, we can calculate the electrical energy consumed by electrical appliances by the product of the electrical power (kW) and the time (h) of use of these appliances [27].

In addition to the electrical power and time affecting energy consumption, there are other factors related to energy consumption, such as the energy efficiency of the appliances, the cost of electrical energy, the sources that generate electrical energy and the necessary care that people should take when using electrical appliances, for example. Therefore, the objective of the game Se Liga is to work on the concept of electrical energy in terms of the electrical power of the electrical appliances and the time of use and the relationships with other factors that interfere in this consumption, thus promoting the possibility of learning during the game and working with a problem present in society, favoring the conscious consumption of electricity.

The game has a competitive mode, with 2 to 5 players playing. The game lasts between 30 minutes and 1 hour. The main mechanics of the game are purchasing household appliances and rolling time dice to determine energy consumption in each round. In addition, there are event cards that interfere with the game and individual bonus cards in action drafting mode that help players. The game ends after 6 rounds.

All players start with a house, a meeple, and 20 coins ($20). The coins are used to buy electrical appliance cards, reroll the dice (1 coin per die), and exchange the available electrical appliance cards for one from the deck (1 coin per card). It is up to the player to manage their money. Figure 8 shows the initial components.

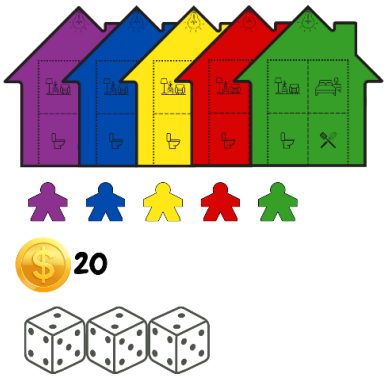

Figure 8: - Initial components

Each player's meeples will go to the starting mark on the board's energy consumption track, shown in Figure 9.

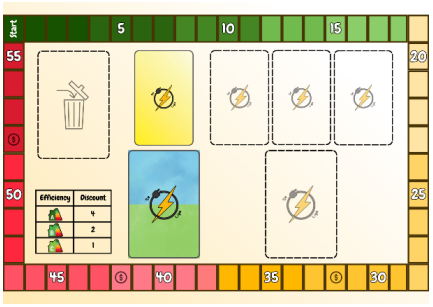

Figure 9: - Board of Se Liga game

On the board there is a yellow card marker with three spaces next to it. This marker is for placing the deck of electrical appliances face up and each round, three appliances become available for purchase by a player. As soon as an appliance is purchased, another is placed in the empty space immediately. In Figure 10 you can see an example of an electrical appliance card and all its characteristics.

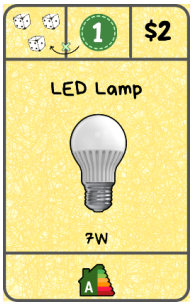

Figure 10: – Electrical Appliance Card example

The dice in the left corner of the card represents the time the appliances used after it was purchased. The amount of die is related to the time that each appliances is on, i.e., appliances that are rarely used use 1 die, appliances that are more or less used use 2 dice and appliances that are used a lot use 3 dice. The top right corner has the cost of the appliance that must be paid by the player who wishes to purchase the electrical appliance card.

The value in the middle of the top represents the energy power level, which is a classification referring to the power of the appliances. In other words, electrical appliances with low electrical power have level 1, those with medium power have level 2 and those with high power have level 3. This classification was created to facilitate the progress of the game. The real power value of each appliance can be seen below the image in Watts.

Some electrical appliance cards have a "safety alert" symbol indicating the risk of electrical accidents. Based on an analysis of the most common electrical accidents [28], electrical appliances involved in most accidents have this symbol in the game. There is a specific event card to work with these cards. Figure 11 shows an example of an electrical appliance card that have a "safety alert" symbol in the left at the bottom.

Figure 11: – Electrical Appliance Card example with "security alert" symbol

The energy efficiency present at the end of the card will favor a discount at the end of the game, but only for cards that have energy efficiency A, B and C. These values that will be discounted for each card are on the board (Figure 9).

Therefore, in each round, players are required to choose one individual bonus card, buy the appliance, roll the number of dice indicated on the purchased electrical appliance card and multiply the value of the dice by the energy power level. The result of this multiplication will represent the energy consumption and will be the number of spaces that the player's meeple will move.

There are event cards that can interfere with the game, three of which help players and three of which create obstacles during the game. The game alternates between these events, starting with those that hinder players and ending with those that help players. Figure 12 is an example of an event that hinders players (blue) and an example of an event that helps players (green).

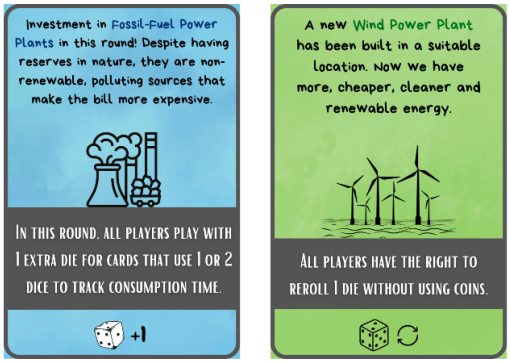

Figure 12: - Events Cards examples

The idea behind the event cards is to show the factors that affect electricity consumption. That's why they all have text above explaining the event and below it, the action of the event in the corresponding turn. The events are shuffled and placed face down.

The last component of the game is the individual bonus cards, which are open at the beginning of the round and before players buy the electrical appliance card, they choose a card to help them that turn. Once chosen, the card stays with them and the number of options decreases as the other players choose. Figure 13 is an example of an individual bonus card present in the game.

Figure 13: - Individual Bonus Card example

Each turn begins with the individual bonus cards, the events card, the dice, the players' houses, the meeples and the board with the electrical appliance cards.

The turn order is determined by the players' position on the consumption track, with the first player being the one furthest ahead on the track (in last place) and the last player being the one furthest back on the track (in first place).

Figure 14 shows a proposed game organization.

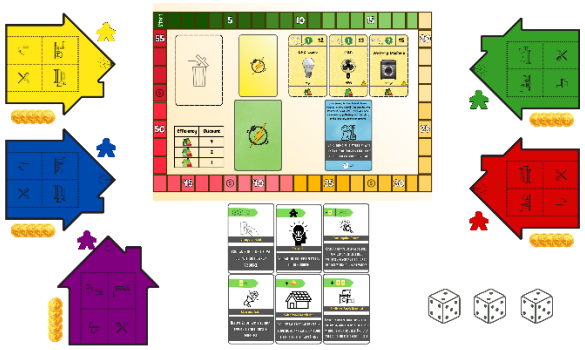

Figure 14: - Components and Organization of Se Liga game

So, through the game Se Liga, players can learn how to calculate electricity consumption, about the electrical power of appliances that are normally used in homes and their impact on energy consumption, the importance of understanding the time electrical appliances are used and their relationship with energy consumption, showing that low-power appliances use a lot of energy if used for a long time and vice-versa, about which energy sources are favorable and which are not, both for electricity consumption and for the environment, the necessary care when using electrical appliances and about resource management, due to the fact that money is given to players at the beginning of the game and they need to analyze how to use their resources to favor the objective of consuming the least amount of energy.

5 AUTOETHNOGRAPHIC ANALYSIS RESULTS

This topic aims to present the results of the autoethnographic analysis in the research and design process of the games Coleta Certa and Se Liga with a proposal for teaching in the classroom.

As a Physics teacher and researcher in Science Teaching, I have been trying since graduation to learn about modern board games, their potential for teaching, the possibilities of working concepts present in the school curriculum into the game, the importance of these concepts for better understanding the world we live in and interfering in society in a coherent and conscious way, and the possibilities of creating and adapting these games so that they are increasingly used in the classroom by teachers.

These objectives were structured into my goal as a researcher and teacher as I studied, developed and applied my board games. Therefore, this process, which began during my undergraduate studies, has been essential for me to follow my path in research and seek results that have increasingly converged into possibilities for Science Teaching.

5.1 Coleta Certa Game

The aim of the Coleta Certa game was to enable the concept of half-life for radioactive decay to be learned during the game in a contextualized way with an application in our society and with the necessary precautions in relation to this application, bringing up the issue of the importance of monitoring radioactive waste. To create the game, I had to deepen my knowledge of nuclear physics in a broad way so that all the details of the game could be consistent with reality.

The game went through several modification and testing processes, until it reached the version closest to the last one developed and tested with higher education students, bringing positive aspects that resulted in its validation and negative ones that led to further modifications [3].

After the game was ready, research into the possibility of applying it in the classroom with secondary school teachers brought even more enlightening results for me in my role as a game designer whose aim is to develop games to be applied in the classroom by teachers, showing that the reality of the classroom and all its characteristics need to be considered as one of the priorities when developing a modern board game for secondary school students. For use in the classrooms, the game has proven to be complex and long-lasting, so suggestions for adaptations were necessary, such as introducing groups competing against each other, combining cooperation with competition and, if possible, having a student teacher at each game table to guide and answer players' questions [26].

Every step of the way in the development of Coleta Certa made me want to try to develop new games that increasingly fit in with all the characteristics presented, leading to the development of Se Liga.

5.2 Se Liga Game

The Se Liga game was designed primarily to teach about electricity consumption and the relationships between time, appliance power, energy efficiency, attitudes and factors that can also affect electricity consumption. The second objective of the game was its simplicity and size, i.e. the idea was to design a game that would enable this learning and that would be small and quick. The process of achieving these two objectives became challenging, as balancing the complexity of the ideal game for the learning process and its simplicity takes a lot of practice.

The first version of the Se Liga game presented the relationship between the concept and everyday life, but the game was very much based on randomness, giving players few options to choose from, which is detrimental to learning during the game experience. In the quest to reduce randomness and improve players' choices, other issues such as adapting the rules to reality arose and the challenges were persistent, requiring consecutive adaptations.

The version of Se Liga presented in this work was tested among peers and showed potential to achieve the desired objectives, with its luck factor reduced and enabling a more enjoyable and favorable gaming experience for teaching about electricity consumption. However, the current version of the game was more suitable for elementary school, where the content is made more dynamic in the mechanics of the game and the relationships with everyday life are established in a less complex way, ideal for those who are having their first contact with the content and who also need to better understand the importance of the relationship between this content and personal electricity consumption. However, the game can also be applied in secondary education and can provide good results, as it has favorable characteristics for classroom application, such as being quick and small, as well as the concepts and relationships present in the game.

For secondary schools, I am developing the Se Liga 2.0, a game with the same name and proposal, but with greater complexity and which establishes greater links between the concept and everyday life. This game in development was designed based on all the issues that arose with Se Liga.

In other words, the process of creating modern board games is progressive and develops game design skills with each challenge that arises. This development of skills supports the creation of games that are closer to the objectives necessary for the possibility of learning in the classroom.

It is a long path that requires a lot of research, reading, application and experimentation with different games, however, it provides a way for classrooms to improve the relationship between content and society.

6 CONCLUSION

When considered in the context of the student's reality, physics teaching tends to have a beneficial impact on their lives and society. For this reason, one can consider the possibility of using these games in the classroom.

There are several types of games, such as quicker, simpler, more complex, for many people, for few people, etc. Thus, if teachers are interested in using this type of tool in their class, they can choose the desired subject and type of game that they think best fits the reality of their school. In addition, there is the possibility of developing new games according to what the teacher wants to work with their students.

As challenging as the proposal of working with modern board games in the classroom may be, the motivated participation of students, the construction of knowledge during the gaming experience and the possible discussions that may arise after the game, relating Physics content to everyday life, favor the search for creating/adapting and researching games so that more and more teachers feel comfortable using them.

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