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Conquering "QUIMIVILLE": The ludic in the teaching-learning of Chemistry content in YAE

Conquistando “QUIMIVILLE”: o Lúdico no ensino- aprendizagem dos conteúdos de Química na EJA

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Abstract

Teaching chemistry should be instigating, problematizing, and challenging, in a way that the aim is to build the student's scientific knowledge. In this way, the present work seeks to contribute, descriptively, as a motivating tool for learning knowledge in the science area, with a focus on chemistry. It is noticed that even with the various current academic productions, there is a lack of works that portray the reality of the teacher in the classrooms in Youth and Adults Education (YAE), particularly with chemistry content. Intending to assist the challenges experienced by education professionals and students, in the school context of YAE, and to arouse curiosity and interest in learning, we sought to bring playfulness to the classroom. Thus, the objective of this work was to develop a board game that makes the content of the Periodic Table clearer and more accessible, instigating its problematization and contextualization. The work is based on the theory of Meaningful Learning that fits the current reality of students and teachers of YAE, who bring all their experience to be shared in the classroom. For this purpose, a game was built and this work will explain its sequence of elaboration, as well as discuss ways to implement it in the chemistry classes for YAE. The work will emphasize the importance of contextualizing chemistry through the QuimiVille game, which familiarizes students with the Periodic Table, promoting that the teaching and learning process is concrete, contextualized, and meaningful.

Keywords: Youth and Adults Education. Games. Chemistry. Meaningful Learning.

Introduction

> An educator who listens, learns the difficult lesson of transformation (own translation)
>
> Paulo Freire

Education as a whole, be it regular education or Youth and Adults Education (YAE), needs to be aware of the student's needs, as well as be part of their reality and be contextualized. It is possible to affirm that there are learning and knowledge production everywhere. As a guideline, education makes us understand and channel its development throughout life through different factors. As defended by Freire (1991), education is a political act; the educator learns by teaching and becomes an endless cycle of knowledge construction.

Currently, different tools are allies of education such as technologies, and teaching strategies transforming daily activities into elements of knowledge, among other examples. It is believed that what has been learned previously helps to acquire new knowledge and modify knowledge already acquired.

The contemporary world permeated by a complex reality brings this understanding and poses some challenges. The change in teaching and research activities requires a mutation in thinking, as portrayed by Caetano and Vieira (2018). By making the classes more attractive to students, with the diversity of possibilities facing their reality and experience, such as the games, and also by the access to online magazines aimed at the continuing education of the educator, the teaching-learning process is enriched both for the school environment as for the external environment. The attitudinal transformations transcend the methodological and philosophical barriers of traditional education, acting in critical and significant scientific education.

The present work had the objective of building a board game, making learning Chemistry and the Periodic Table more clear and accessible, instigating the problematization and contextualization of the theme, thus, proposing different approaches to the traditional ones in Chemistry classes of Youth and Adults Education (YAE). According to Carvalho; Guimarães de Azevedo and Miranda Guimarães (2020, p. 3), the Periodic Table “[...] does not need to be memorized, but understood”.

One of the reasons for choosing the theme was the lack of interest on the part of the students in the Chemistry classes. The interest of the teacher in motivating curiosity, assuming that games can be an interesting way to help in the teaching-learning process was another reason. The work of Romano *et al.* (2017) presents how didactic games can contribute significantly to chemistry classes, breaking a possibly existing pre-concept in relation to the discipline.

> On the other hand, knowing the names and symbols of the main chemical elements is extremely important for the knowledge and use of the language of chemistry, as well as knowing the letters of an alphabet is essential for the establishment of written communication (GUIMARÃES; CASTRO, 2020, p. 3). (own translation)

The construction of the pedagogical game proposed in this work had the Vygotskian theory as a guide.

> The Vygotskian theory defends that the development of the individuo, since the beginning of life, occurs due to a process of appropriation that he realizes of the cultural meanings that surround him, which makes him arise to an eminently human condition, a being of language, awareness, and activity, transforming from a biological to a socio-historical being (VYGOTSKY, 1999 apud NUNES; SILVEIRA, 2015, p. 50). (own translation)

In addition to Vygotsky's theory (1999), this work is also based on Ausubel's Theory of Meaningful Learning, to support the teaching-learning relationship. Faced with the challenges of teaching chemistry at YAE, the game created, QuimiVille, can be a fundamental tool to trigger the process of building knowledge from students' previous knowledge, relating them to new ones. In this way, it would act in fixing the content covered, however, significantly for the learner.

It is believed that the proposed game will encourage student's interest and curiosity in a more dynamic way, presenting itself as an alternative to the traditional methodology, making memorization, not the unique resource, but reinforcing the development of the student's ability to reflect, explore and share his knowledge in the school environment.

This tool becomes important because the use of the game to build knowledge in a significant way can contribute to increasing interest and the student's teaching and learning process in chemistry classes. Thus, the board game within this perspective becomes the pedagogical key, considering that it is part of the students' daily lives.

To keep up with the current world, technology should not oppose teaching but complement it. Students, in their daily lives, receive numerous stimuli and information that, if not contextualized, to make them meaningful, problematizing becomes a lot of empty and meaningless information. For these connections to be made either in YAE or in regular education, the teacher must have initial and continuous training focused on adaptations necessary for more consolidated, but pleasurable learning.

Despite many advances concerning teacher training, the picture is complicated in terms of professional qualification and is much more tenuous when it comes to Youth and Adults Education (YAE). The current conditions do not favor, no matter how many teachers try to build favorable scenarios that can stimulate significant learning and reconstruct concepts so that their previous knowledge is considered. Thus, according to Moreira (2012, p. 6) "[...] meaningful learning is characterized by the interaction between previous knowledge and new knowledge" (own translation).

Education has several teaching modalities, most of which aim at meaningful and quality learning. The knowledge built throughout life can be an auxiliary element to new knowledge, forming, then, a citizen with critical and autonomous thinking. Especially in YAE, the educator takes on the role of mediator, presenting the student with the best path to be followed.

YAE is a complex teaching modality, supported by law, which involves dimensions that transcend educational issues whose audience is mostly composed of black adults, young people, workers, women who lost the opportunity to complete their formative processes in the so-called regular time. YAE, due to its diversity, tends towards a more liberating and humanistic education, as believed by Freire (2019), who in his works portrayed the reality and challenges of this modality.

For Arroyo (2005, p. 19), YAE "[...] is a field not yet consolidated"(own translation) in terms of public policies, teacher training, and pedagogical projects and research. Society must understand that it encompasses training processes of a different nature, which is not a second-line education.Drawing a parallel between YAE and science education, we realize that this is also a great challenge, with creativity being a watershed where teachers need to break traditional paradigms of pedagogical practice to encourage students to present new content. Aiming at the current needs of science education, with an emphasis on the area of Chemistry, teachers have provided the most varied playful proposals that contribute to educational and social training, to instigate the awakening of students to bonds and interactions that pay attention to their reality. Thus, the question is: how can play be part of teaching chemistry, facilitating the teaching-learning process for YAE? Having this in mind, the objective of this work was to develop a board game, designed in the first year of YAE High School, which makes the content of the Periodic Table clearer and more accessible, instigating its problematization and contextualization, facilitating the learning of the characteristics of particular elements.

Theoretical background

Youth and Adults Education (YAE) is an important field of research in the educational area since it encompasses training processes of a different nature, which were neglected by government policies, being a means that, in this marginalized perspective, is configured as a second line education. It is important to emphasize that for YAE students, the teaching-learning process, as they are adults, occurs differently from that of children and adolescents. While Pedagogy is a widely researched field and is related to the processes or theories of children's learning, there is another field called Andragogy that encompasses the ways of educating adults, understanding their specificities. According to Carvalho *et al.* (2010), andragogic studies started with Lindermam (1926). A few decades later, Knowles, in 1970, brought to light Linderman's ideas and in 1973 introduced the term andragogy (from the Greek: Andros = adult and gogos = educate) (CARVALHO *et al*., 2010).

In general, the teaching-learning process cannot be seen as a deposit of knowledge. The teacher must change roles because he/she needs to be a mediator of the knowledge that will be built. The main role of the teacher is to create a favorable atmosphere, creating ~~a~~ friendly environment in the classroom, motivating them, and establishing the principle of democracy and not oppression, in contrast to the traditional education that presents, many

times, a negative picture. For YAE students, school success or failure may be related to how they manage to perceive boundaries as two universes, the daily one and the scientific one, but do not recognize that they belong to the same universe. Freire believed in a more humanistic and emancipatory education. For Freire (2019, p. 57):

> In the “Banking” view of education (“visão bancária da educação”), “knowing” is a donation from those who think they are wise to those who think they know nothing. Donation is based on one of the instrumental manifestations of the ideology of oppression - ignorance turned absolute, which constitutes what we call alienation of ignorance, which advocates that ignorance is always in the other person, not in the own person. (own translation).

Being a teacher is an act of courage, being a teacher at YAE is a humanist act. Since the initial training of the teacher has little to do with YAE, daily practice becomes the missing training. The teacher-student relationships enable significant interactions between their culture and the school, encouraging scientific reasoning. It grows with each life story. As Freire says (2019, p. 68):

> In this way, the educator is no longer the one who only educates, but the one who, while educating, is educated, in dialogue with the student who, when being educated, also educates. Thus, both become subjects of the process in which they grow up together and in which the “arguments of authority” are no longer valid. To functionally be an authority, you need to be for freedoms and not against them (own translation).

According to Alvarado-Prada; Freitas; Freitas (2010, p. 369) “Training is a lifelong process [...]”(own translation). Therefore, it is necessary to start by knowing who the subjects of YAE are, as well as the historical trajectory of this modality in the country, with a more positive perspective to the restructuring that includes everyone. For Arroyo (2005, p. 19):

> The field of Youth and Adults Education has a long history. We would say that it is a field not yet consolidated in the areas of research, public policies and educational guidelines, the training of educators, and pedagogical interventions, open to all kinds of research and where several agents participate (own translation).

Within the perspective approached by Moreira (2012a), Ausubel's Meaningful Learning created in the 1950s, becomes a current and applicable theory for our framework, since we have believed in the success of his theory since then. Significant Learning, unlike mechanical learning, is one where new knowledge will acquire meanings in the interaction with existing knowledge in the student's cognitive structure.

According to Moreira (2012a, p. 6),

> [...] mechanical learning is based on memorization, meaningful learning is characterized by the interaction between previous knowledge and new knowledge, and that this interaction is non-literal and non-arbitrary. In this process, new knowledge acquires meaning for the subject and previous knowledge acquires new meanings or greater cognitive stability (own translation).

However, Moreira (2012a, p. 30) also believes that "[...] this cognitive experience is not restricted to the direct influence of the knowledge already acquired on the new learning, but it can also encompass significant changes in the pre-existing cognitive structure" (own translation).

Guimarães and Castro (2019) also believe in the theory of Meaningful Learning, following two principles of its process. The first refers to the fact of ignoring general information and of incorporating a discipline to later proceed with the progressive differentiation and the integrative reconciliation of the content, according to the degree of complexity. According to the authors:

> In integrative reconciliation, it is necessary that the instructional material is made to instigate the relations among the ideas, to indicate the significant similarities and differences, reconciling the real or supposed divergences. The two principles are simultaneous processes that happen, purposefully, at the same time (GUIMARÃES; CASTRO 2019, p. 204). (own translation).

The referred authors adopted as a basis the cooperative learning called Jigsaw, which is a teaching method that aims at equal opportunities for all students.

For Cochito (2004) in the work of Guimarães; Castro (2019, p. 204):

> [...] cooperative learning is considered an effective teaching strategy when it aims to provide everyone with equal opportunities, since the work is developed among groups that interact and help each other. Cooperation, solidarity, and autonomous work are essential points to build a cooperative classroom (own translation).

It is challenging to teach chemistry essentially at YAE, for demotivational, structural, and political reasons. Most of these students have been out of school for a long time. They present difficulties and resistance to teaching, and often end up frustrated with this return to school. These students are not aware of the importance of chemistry in their daily lives. As a result, a didactic board game was schemed and developed to be useful in the classroom. It was based on the theories above mentioned, seeking a cooperative apprentice and the use of existing knowledge to develop a new one. According to Romano *et al.* (2017, p. 1236):

> [...] the use of games in the classroom is very suitable as a means of motivation and improvement in the teaching-learning relationship concerning the teaching of Chemistry, a discipline that is difficult to learn and, in many ways, out of context and meaningless to most students(own translation).

For the game to become pleasant and useful, teaching chemistry should be instigating, problematizing, and challenging, in a way that the aim is to build the scholarly scientific knowledge guided by the game. Truly, it can be recognized that it is possible to rescue the student's memory during the game.

Methodological Pathway

This work is the result of a Course Completion Work for the postgraduate course in YAE, in a descriptive character, using as methodology a qualitative

approach and the reflective analysis of the game elaboration records presented. It emerged from the perspective of constructivist theories, in the adult education scope, and from the possibilities of action through a bibliographic review, which supported the playful instruments aimed at the teaching and learning process in YAE.

This methodology is divided into two stages: first, the description of the theory that underpinned the practice; second, the methodological steps for the elaboration and construction of the *QuimiVille* game.

To start the construction of the game, we sought to learn about the theoretical foundations, among them Moreira (2012), who describes the importance and definition of Meaningful Learning; Alvarado-Prada; Freitas; Freitas (2010), Freire (2019), and Carvalho *et al.* (2010) who address teacher training and its challenges in the classroom, and the need to work on the basis of andragogy in the YAE classroom; and, Romano *et al.* (2017) and Vygotsky (1999), to focus on educational games as motivating tools for learning and building knowledge.

The second topic of the methodology is the description of the methodological steps for the elaboration of the game with chemistry content. The intention was that, through the game, it should be possible to achieve the learning of new knowledge based on previous knowledge, using the students' experiences for the new content.

To this end, the QuimiVille game was created, based on the board game Carcassonne (Z-Man Games®), because it is a game of discoveries, territory conquests, demands attention and creativity, in addition to being a historical game. Carcassonne is a city in southeastern France, known for being walled, a historic fortress, important in the 3rd century AD when it served as a fortification for the Romans and in 5th AD. When it was dominated by barbarians, there had already been centuries of history and conquests in the city,–accumulating a historical weight, and is currently known as a touristic and cultural spot. With this historical scenario, players will put their followers on the roads, cities/kingdoms, monasteries, and fields of the region, a region that changes as the game progresses. To achieve victory, it will be essential to place the followers in the right position.

The cards and some original rules were modified to create the game “QuimiVille”, setting up a city with the format of the Periodic Table, through the connections of the cards. The shaping of each kingdom / small city, monastery, or road will be based on the characteristics of the elements and the orders of the families. The game is composed of three main actions: placing “terrain” cards, placing followers, and counting the points.

Research Findings - The QuimiVille Educational Product

QuimiVille is made up of 90 cards. For its construction, it is suggested that they are made of colored paper and laminated paper, pasted on a rigid surface in the size of the card and the board. In this way, the cards will be preserved to be used more than once in the classroom.

The cards are made 4.5 cm wide and 4.5 cm high, and the periodic table in the format of a game board, which should also be printed in color and laminated in

the size of 85 cm wide by 40 cm high. The game lasts 40 to 50 minutes to finish, that is, a lesson time.

QuimiVille is designed for two to five players, starting with three “river” cards that will be different on their back. The game will be developed around this river, which will be located in the middle of the transition metals, seeking greater knowledge of the center of the periodic table. The back of all cards is lighter in color (Figure 1). Only the initial cards have a darker color on their back, which serves to differentiate them from the others.

Players will take their turns placing “terrain” cards, thereby creating roads, building imposing small cities/kingdoms, villages, or monasteries (as monasteries are important and stand out in the game, consider this fact to represent transition metals that are more common and seen in the student's routine: Iron, Gold, Silver, Copper and other important elements, such as Hydrogen, Oxygen, and Helium). They will also cultivate fertile fields in the region. In the end, there will be a kingdom in the shape of the periodic table. Along with this, they will place their followers as thieves, knights, monks, or farmers. Victory points will be awarded during the match and at the end of the match. During the game, there will be a periodic table available for the groups to help the players. When the game is over, the points will be added and, thus, the winning player will be determined. The cards will have information about the properties of the chemical elements. The front of the cards will show the coat of arms, the symbol of the chemical element, and the atomic number. The back of the cards, will show the name of the element and its electronic configuration, so that it will help the player to identify the location of the element in the Periodic Table and of the complimentary cards. These "tips" about the electronic configuration indicate the period of the element. By showing content in chemistry in a more fun and real way, learning becomes more concrete and interesting for the players/students.

When used in the educational process, the game has the fundamental capacity to put two attributions together: playfullness and the educational dimension. Playfulness refers to the pleasure and fun that the game provides and the educational dimension refers to the scientific knowledge and to the knowledge acquired in life. To achieve results that are indeed satisfactory, it is used as a facilitator, stimulator of creativity, integrator of sociability, by sharpening the ludic for knowledge. Thus, the game will contribute to a greater fixation of the content, through experience, logical reasoning, coexistence, and development of ideas among the group.

Figure 1: Back of the cards, the darker label at the beginning of the game.

Source: Elaborated from WREDE, Klaus-Jürgen (2016).

Game Description and Rules

The QuimiVille game is played clockwise by two to five players. Each player in his turn will perform actions (indicated below), always following the order indicated. To continue the game, the second player's turn begins: he/she is on the left of the previous player, and so on. During the round, the teacher observes the actions and explains them one by one. The possible actions will depend in part on the roads, cities/kingdoms, villages, or monasteries that appear on the cards, always respecting the positions according to the places of the elements in the Periodic Table. In the end, the format of the city will be of a Periodic Table (Figure 2), the size of its territory being 18 cards (representing the families of the elements) for 7 cards (representing the period). The aim of the game is for the player to conquer the most points/territories, and this will only be possible if the player/student is familiar with the Periodic Table.

As this familiarization is necessary, we believe that the players, after learning the dynamics of the game, will seek for this familiarization on their own, in order to win or even complete the game more easily in a second chance.

Even though it is a competitive game, which is not common in education, we corroborate with Huizinga (1996, p. 59) who states: “[...] the one who talks about competition, talks about the game” (own translation). For the author, there is no reason to refuse this characteristic of the game to any kind of competition. Thus, like Santos (2017, p. 39) who stated in his work that “Our view of competition is associated with the idea of a dispute between individuals, groups, teams, aiming at overcoming personal or collective limits.” We agree that “QuimiVille”, despite carrying this characteristic of competition, will encourage students to learn the contents, due to a condition inherent to our species: we are always encouraged to seek success. However, even if victory is not achieved, as Santos says (2017, p. 39): "[...] we believe that accepting and respecting the final result is substantial ~~to~~ in the game."

Figure 2: Final game format.

Source: Own author.

Starting the game

Players must identify the cards that will start the game (these are the cards with the darkest side) (Figure 3).

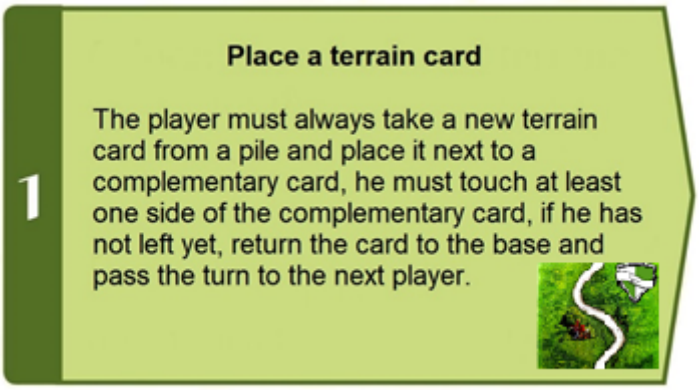
Figure 3: Back of the cards at the beginning of the game.

Source: Elaborated from WREDE, Klaus-Jürgen (2016).

The following topics (from 1 to 3) will show cards that are part of the instruction manual of the game, with their respective figures indicating the rules. The first card (Figure 4) brings the initial rules on the “terrain” cards, the second (Figure 11) addresses how to place the followers in the game and the third (Figure 12) addresses the score count at the end of each shift/round.

1 – Place a terrain card (Figure 4)

Figure 4: Initial rules.



Source: Elaborated from WREDE, Klaus-Jürgen (2016).

As described in Figure 4, the player should take a new “terrain” card from a pile and place it in the position corresponding to the chemical element described on the card. The card, removed from the pile, must touch another complementary card. If the card taken from the pile does not have a complementary card, the player must return it to the base of one of the piles and pass the turn to the next player until he finds the card complementary to any of the cards on the board. All cards fit together, maintaining the city format. If any card has been positioned incorrectly, the player loses 2 points.

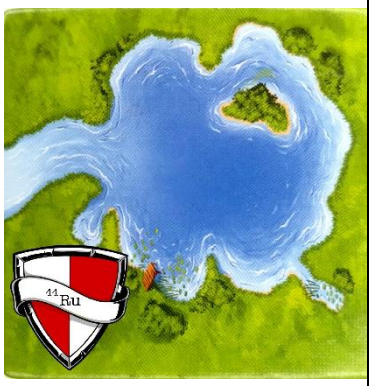
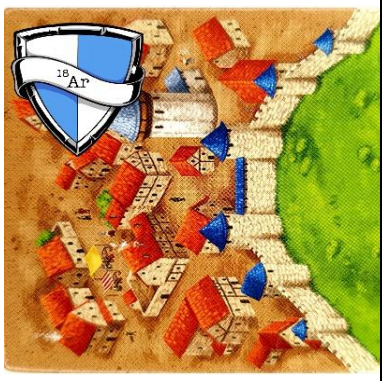
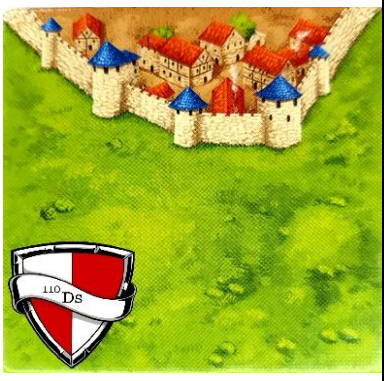
See the examples of some cards in the game (Figures 5 to 10):

Figure 5: Road card

Figure 6: Monastery card

Figure 7: Village card.

Source: Elaborated from WREDE, Klaus-Jürgen (2016).

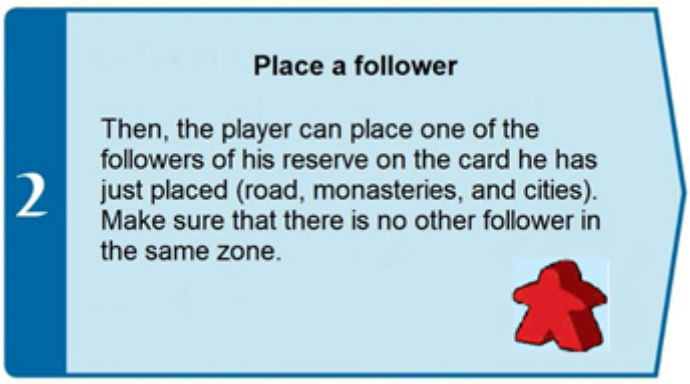
Figure 8: River card.	**Figure 9:** Parts of small towns or kingdom chart.	**Figure 10:** Parts of small towns or kingdom chart
		

Source: Elaborated from WREDE, Klaus-Jürgen (2016).

Each card shows the symbol of the element in the front of the card and the name of the element and the electronic configurations on the back of the card.

2- Place a follower (Figure 11)

Figure 11: Rules for placing followers on cards



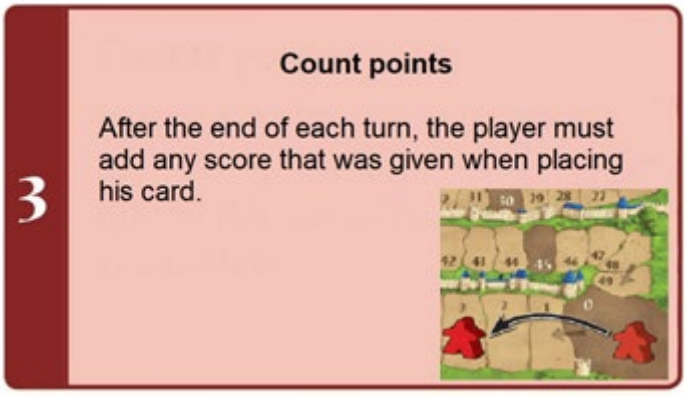
Source: Elaborated from WREDE, Klaus-Jürgen (2016).

The next step is for the player to place one of the followers of his reserve on the card he has just deposited on the board (road, monasteries, and small

towns/kingdoms). This player must make sure that there is no other follower in the same zone.
After having deposited the card, it is now possible to place one of his followers on one of the cards marked "road". This can only be done if there is no other follower on the same road. However, if the road is not completed, the points will not count yet. Then, the next player's turn will begin. The second player will take a card and deposit it on the board. If the card continues some road (or small towns/kingdoms) that already has followers on the other cards that complement them, the player can place the follower on the card he has just drawn. Finally, the one who has more followers on the roads (or small towns/kingdoms) gets the points. A follower can “steal” the points intended for another player. If the players have the same number of followers, the points will be shared.

3- Counting points (Figure 12)

Figure 12: Rules for counting points.



Source: Elaborated from WREDE, Klaus-Jürgen (2016).

In order to have a score, the player must be aware that the count is always done at the end of each round.

- Road: Every time a road closes at its ends, a score is given. For each card on the road, the player gets 1 point. As the road runs through 3 cards,-the player can get up to 3 points.
- City/kingdom: Each card that the complete city covers is worth 2 points. Besides, each coat of arms within the city adds 2 more points.
- Monastery: It is worth 1 point per card.

If there is more than one player in the same zone, the player with the most followers on the road or in the cities/kingdoms will get the points. If there are several players tied with the highest number of followers, everyone gets points.
The player must add any score that he/she was given when placing his card and whoever has more points, that is, territories, wins the game.
Although this game was not applied because of the suspension of the school calendar (Covid-19 Pandemic), it was thought for YAE classes in the 1st year of

high school, being ideal for two classes lasting 50 minutes each and with a maximum number of two to five students per group, as previously mentioned.

Game Potentials

As emphasizes Lutz *et al.* (2018, p.3), "[...] playfulness must be present not only in the teaching-learning process of Early Childhood Education, but at all levels of education"(own translation). We corroborate with the authors above cited since, at YAE, teaching becomes challenging due to the great diversity and passivity of the students. As stated by Carvalho (2010), YAE students cannot be taught traditionally, as children and/or adolescents are. It is necessary to associate theory with everyday experience. Thus, as a pedagogical contribution, the game has the possibility of bringing the content taught in the classroom to reality, leaving the bounds of traditional teaching, respecting and stimulating the student's previous knowledge, making education for freedom closer.

We can find in Vygotsky a basis for the discussion about the contribution of the game to the development of the subjects of the YAE. As for the formation of the subject, there are two different aspects to consider, the elementary and the higher functions. The elementary function is governed by biological limitations, it occurs naturally. The superior function needs external stimuli that directly influence the subject. Thus, the social/cultural process begins in the biological order, but the environment and its experiences directly affect its development and thinking (Vygotsky,1999). In this way, it can be argued that in a game like QuimiVille, students would have the opportunity, through the construction of the city and interaction of the cards with the conquered places, to recover the previous knowledge of their experiences. Besides, when playing the game, the students are stimulated to a better interaction with the classemates and the environment, a factor that would act directly in the superior function, promoting the formation of the subject.

In general, games also allow students to be contemplated with varied resources through these activities, whose characteristics are of practices beyond the standards of traditional teaching, which are more pleasant and concrete to students. Thus, still according to Vygotsky (1999), learning occurs when the information makes some sense to the subject included in a social context. With that, the interaction between the participants would make it possible to get to know various points of view, providing opportunities for the social development of the person through these playful attitudes, as well as philosophical and methodological.

Final considerations

The present work sought, through the elaboration and discussion of suggestions for possible use in the classroom, to present the QuimiVille game as a playful, interactive proposal, capable of being worked on in YAE classes

through Meaningful Learning. Such a game was made with the aim of enriching the teaching of chemistry, concerning the content of the Periodic Table, through the learning of particular characteristics of each chemical element. It was built for the YAE modality, particularly based on the Chemistry curriculum matrix for the first year of High School. However, it can be applied in other modalities, from the last years of elementary school up to the graduation of Chemistry or other courses that include this content. It can also be used in undergraduate courses that need to realize that playfulness can enrich the teaching-learning process.

Aiming at the current needs of Chemistry Teaching and knowing that education is a continuous process that occurs throughout life, QuimiVille focuses on contributing to educational and social training. Teaching chemistry should be instigating, problematizing, and challenging, in a way that the purpose is to build the student's scientific knowledge and develop a tool for teachers to use in the classroom.

From the complex perspective of the YAE modality, the difficulties of the students are always present in the classroom: classes with reduced time, evening classes after a day of work, back to school after years away, among other challenges. Then, for some success, it is necessary to aim at attracting the interest and attention of these students. One of the possibilities to achieve this objective is what we propose: to attract their attention through the game, transforming learning into something meaningful; the student breaks the passive position and becomes the one that holds and transmits the information, and, consequently, the builder of his own knowledge, breaking the barriers of traditional education. They discover their skills, using their knowledge to acquire new knowledge. Taking into account the situation of YAE, restructuring measures must be thought out for the teaching of students and the classroom practice of teachers in this modality.

Didactic games are characterized by freedom, by bringing in itself the role of guiding and triggering the player's inner knowledge, the knowledge that perhaps they did not even know they had inside, making the teaching-learning process more accessible and dynamic. Understanding the interface of games in education is to understand the importance of the history of its subjects and the role of teachers in presenting situations that favor and encourage learning, and it is also a proposal for social and cognitive development for students and teachers.

Hence, in relation to the early questioning about the possibility of playfulness to be part of the study of chemistry for YAE as well as how it could be developed, it is considered that what has been described and discussed throughout the text answers allows sayng it is really possible to bring the playfulness for such modality. Besides, at all times during YAE classes, there is a need to contextualize the most abstract contents, and it can also be perceived by the student's statements that the implementation of playfulness brings motivation. Thus, care was taken that the format would be attractive and motivating for the student, regardless of the content. QuimiVille, with its format shaped in on an existing game, having with all the rules explained since the beginning, can bring

Chemistry to the student's daily life. This shows that it is possible to achieve the objective that was proposed, to make the content of the Periodic Table clearer and accessible when it problematizes and contextualizes such content.

QuimiVille is important for teaching chemistry, as the games successfully promote the association of the contents covered with what they are experiencing in practice. Therefore, games as a pedagogical methodology promote the idea of easier and more dynamic learning, articulating the theoretical concepts in the practice.

However, the game due to external reasons (COVID-19 pandemic) could not be applied and consequently validated. The application of this game may be adapted to the digital medium in the future, and, after this, a round of conversation about the game and its benefits with the class is suggested for a general evaluation of the game and for adaptations if necessary.

CIn conclusion, if, in the construction of knowledge, there is a rescue of the previous knowledge to ground the new one on it, we believe that it is possible to promote a real, contextualized, and meaningful one for the student.

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