Mapping needs, motivations, habits and strategies of RPG players in the context of water resources management

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Abstract—This paper presents an analysis of the strategies used by the players of a Role-Playing Game (RPG) in the context of water resources. Our research is a theoretical framework that informs the practice and states the implications for educational practice with a focus on action. RPGs are widely used in several areas because individuals have strategies that come close to reality. In the context of water resources, RPG helps in the process of understanding the problem and how each player thinks, analyzes, observes a situation from his perspective, and thus elaborates strategies that s/he deems relevant to her/his role and the game as a whole. The RPG developed in this research refers to the participatory management of water resources, based on data from the state of Rio Grande do Sul/Brazil, and focusing on the pilot application of the work in the Lagoa Mirim and São Gonçalo Watershed Management Committee, which involves the cities of Rio Grande and Pelotas, in southern Brazil. The main contribution of this work is an empirical study on the RPG players' motivation and how they elaborated on their strategies. In this research, we measure the habits of RPG players through a semi-structured interview that was applied to a group of these players to assess the habits and strategies of individuals during the RPG.

Index Terms—Role-Playing Games, Collective Subject Discourse, Water Resources Management

I. INTRODUCTION

The entertainment games market grows every decade and companies like Tencent, Sony, Microsoft, Apple, and Google, earn billions of dollars annually [1]. The focus of these games is fun, the challenges that they offer players, immediate feedback, continuous scoring, and also allow to automatically estimate individual and automatic self-recognition [2]. These sensations are related to the theory of flow, studied and proposed by the psychologist Mihaly Csikszentmihaly, which is presented by the mental state of students in total immersion in some activities, as occurs during they play games [2].

Another very relevant aspect of games is to incorporate their use as a learning resource, since the playful activity provided by them can contribute to the development of different skills, helping to understand some reality, culture, rules, or different social roles [3], [4]. In this context, the importance of games in education is emphasized because as [5] points out, the game has been the object of research and scientific investigation for some years, and how this activity influences the lives of individuals. According to [6], one of the learning processes stems from the interactions experienced by individuals, so the playful game and Role-Playing Games (RPG) create conditions for the individual to exercise an imaginary plane in a given situation, such as following rules or representing roles of society.

Considering the educational context, games must have clear learning objectives, assist in the teaching of disciplines, provide the development of important strategies and skills to expand the cognitive and intellectual capacity of individuals [7]–[13]. [14] emphasize the importance of RPG using in Education, which takes advantage of a wide variety of game resources, which can assist in the teaching and learning process. Also, the authors mention the importance of practical experience to help students become familiar with the content and learn from real cases. In this way, the concept of Serious Games applies to this scenario as they are games for teaching and learning. According to [15], they are defined as “a mental contest, played with a computer according to specific rules, which uses entertainment to promote government or corporate training, education, health, public policies, and strategic communication objectives” [15, p. 26].

Analyzing the context of a game, where the individual plays a role, as in RPG, called strategy games, another important concept is observed, the theory of psychodrama. This theory is based on investigating psychological phenomena through human action, i.e., it is a therapeutic model that explores dramatic representation, which enables the free performance of roles and their bonds, working to expand them [16].

In the literature, serious games and strategy games are applied in several fields, as health, education, or professional training. In this paper, the Collective Subject Discourse (CSD) was analyzed, using RPG in the field of Natural Resource Management. Our research is a theoretical framework that informs the practice and states the implications for educational practice with a focus on action. The management of natural resources is becoming more relevant each year due to the growing demand of the world population and the various conflicts that exist in their distribution and sharing. Nevertheless, the management of renewable resources in complex systems,
mainly the water resource in the context of a hydrographic basin, is an important context in the search for possible solutions to the problems faced by those interested in a given ecosystem [17].

This paper is structured as follows. Sections II and III present the theoretical bases of this work, collective subject discourse, and serious and strategic games, respectively. Section IV presents the methodology adopted in our work. Section VI presents the discussions about the speeches that we found on our individuals. Section VII presents conclusions and future works.

II. COLLECTIVE SUBJECT DISCOURSE

The Collective Subject Discourse was built from the assumptions of the Theory of Social Representations [18] and was initially applied in the health field to express and to process collective opinions. Currently, it has been used in other areas such as Education, and Computing.

The CSD is expressed through a speech issued in what could be called the first-person (collective) of the singular. It is a syntactic self that, while signaling the presence of an individual subject of discourse, expresses a collective reference of singular speech to obtain a collectivity. This collective discourse expresses a collective subject, which enables social thinking [18]. However, in the CSD, speeches are not canceled or reduced to a common unifying category. The speeches are constructed from pieces of individual speeches, as in a puzzle. As many synthesis discourses are constructed as are deemed necessary to express a thought or social representation about a phenomenon [19].

The collective subject cannot speak because, in Portuguese, the possibilities offered are precarious, just to access directly, the collective subject, which is the pronoun “we” of the plural first-person, in the absence of the alternative of “collective self”. However, when the collectivity is expressed in the first-person of singular, and it illustrates the operation of the social representations system. Besides, the CSD is a feature that enables the social representations as collective facts inherent qualitative collectivity (speeches) and quantitative (of individuals), i.e., individuals can share the same views but when such individuals opine individually may transmit only a portion of the view shared content [18].

The CSD consists of analyzing the verbal material collected from each of the speeches (as interviews or questionnaires) the central ideas and/or anchors, and the main key expressions of these speeches. The speeches are composed in the first-person of singular by the key expressions. Key expressions (KE) are the most significant passages; the Central Ideas (CI), which are the synthesis of the discursive content manifested in the KE; and anchors are the explicit linguistic manifestation of the theory, ideology or belief that the author of the discourse adopts and that is being used by the researcher to frame a given situation [18].

Therefore, CSD is a methodological strategy that, using a discursive strategy, aims to make a social representation clearer as well as the set of representations that make up imaginary data. Through the discursive mode, it is possible to better visualize the social presence as it appears not in an “artificial” form as pictures, tables, or categories, but under a “more vivid and direct” discourse, which is a real way of the individuals think.

III. SERIOUS GAMES AND RPG

The Serious Games have as their main objective the teaching and learning of individuals, and they can be applied to several areas of knowledge and used for different purposes. In [20], this type of game, based on learning, transcends traditional learning because aspects such as fun and pleasure in the game experience are considered and the elements of learning are not so evident. Also, some motivational elements as curiosity, challenge, fantasy, and control are intrinsic to a serious and effective game. In this way, benefits are observed in the use of these games: development of skills, engagement, and interaction with individuals, increased learning and greater control over it, behavior modification, and others [7], [8].

RPG is a kind of strategy game where players “play” a character, created within a certain scenario, also known as the environment. These characters follow a certain set of rules so that their actions/goals are organized and delimited within the game environment [21]. This type of game is widely used in training, as it can put players in decision-making situations similar to the real ones, but without effective consequences, especially in large companies for employee training courses due to the playful factor involved in the games, which causes that the training and/or learning of a certain subject is facilitated [21].

RPG is located between games and theater and consists of a technique in which rules and behaviors of players are determined, as well as an imaginary context (environment). They can assist in understanding some aspects of social relationships, allowing direct observation of interactions between the players [21]. For the analysis carried out in this work, an RPG applied to the management of water resources in the context of a hydrographic basin was used as a case study. [21] specified the roles, actions, and organization of this scenario.

[22] presented a study of water resources management, multiagent systems (MAS), and RPG areas, as well as their integration with the initial participatory management modeling of the actors (agents) involved in this case study.

Figure 1 shows the basic interactions between agents, their roles, and the influence they assume in the environment where they are inserted. Agents can be divided into three groups: i) regulatory agents that manage public financial resources intending to control pollution without harming production (mayor and alderman); ii) inspection agents report irregularities linked to the production and exploitation of the environment (Environmental Supervisor agent and Non Governmental Organization – NGO); and, iii) producer agents explore the environment with the main objective of obtaining financial resources (businessman and farmer).
This work was developed in the following steps: i) initial explanation about the proposal of the experiment (game); ii) participation of individuals in an RPG on the management of water resources; and, iii) application of an interview to analyze the participation and perception of the game.

The individuals who participated in the experiment sample were chosen at random by sending an e-mail to participate in the game. The sample of individuals who were interviewed, however, were the same who participated in the game. The sample consisted of 16 people (seven women and nine men). All participants are from the computing area, composed of four professors, seven graduate students, five undergraduate students. The interviewees are between 16 and 66 years old, all from Brazil (ten people live in Rio Grande City and six in Pelotas City). People were asked the following questions:

1) Do you like games in general?
2) What period of the day do you usually play?
3) What kind of games do you like?
4) Do you like strategy games?
5) Did you know role-playing games before participating in the experiment?
6) If you know, do you often play?
7) How would you define the term “role-playing games” or RPG?
8) Did you enjoy to play the game? Why?
9) Do you think the game represents society’s attitudes? Why?
10) Do you have any suggestions to improve the game?
11) How did your RPG experience in this experiment?
12) Did you have some difficulties to play in this experiment? If yes, which are?
13) What was your role in the game? What did you think about your role?
14) What strategies did you use during the game?
15) How do you perceive the other players’ strategies in this experiment?

16) Do you agree with other players’ strategies?
17) Were the players concerned about the environment? Why?
18) How did the game change your perspective about the game problem?
19) How do you define the water resource management problem?

The analysis process followed the following steps: i) doing and recording individual interviews; ii) transcription of the interviews; iii) analysis of each transcription to identify key expressions and central ideas; and, iv) construction of the speeches. The recordings took 2:48:56 hours (in particular, two interviews lasted 29:51 and 22:25 minutes), however, the average interview time was of 00:10:14 minutes. The transcripts contain a total of 27,051 words.

V. RESULTS

For this paper, four speeches from the questions proposed in the methodology section were considered, three CI and their respective anchors. Note that all CSD were composed in the singular first-person, with the KE of similar speech meaning from 16 individuals that were interviewed. Our speeches were generated from the colors: red (CI – RPG as individualistic strategies and also as an individualistic survival game), brown (CI – The RPG as an interesting social activity) and violet (CI – Relationship between game and reality), which are respectively CSD1, CSD2, CSD3, and CSD4. In black, information that was not considered because are not relevant to KE, and CI.

This collective person is talking as if it was an individual, i.e., as a discourse of the “natural” subject, but it represents various individuals, allowing the emergence, both qualitative and quantitative, of a collective opinion: qualitative because it is a speech with expanded content, diversified for the construction of CSD and quantitative (of individuals), that is, individuals can share the same views but when these individuals opine, individually may transmit only a portion of the view shared content [19]. As the questionnaire was applied with people, some answers had orthographic mistakes, that we kept exactly as they spoke, as the discourses presented.

Tables I, II, III, IV, V and VI show examples of KE, CI and, anchor of the questions 7, 8, 9, 10, 11 and 13, that originated our four speeches. In the KE column presents the exact responses of people on the questionnaire are presented, respecting the tense verbs and original writings of them; in the CI column presents the interpretation of these responses; and, in the “Anchor” columns presents the associated theories related with each CI.

For example, when a person says “I thought it was very dynamic as the rounds went on, as we play,” and we put as a CI “RPG as individualistic strategies” and “The RPG as an interesting social activity”, and the “Flow Theory” as an anchor.

The anchoring “Flow Theory” and the “The RPG as an interesting social activity” CI, originated from the speeches related to the questions 8 (Table II) and 11 (Table V) we
<table>
<thead>
<tr>
<th>KE</th>
<th>CI</th>
<th>Anchor</th>
</tr>
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<tbody>
<tr>
<td>The RPG, I would define it as a strategy game where it is necessary to analyze the strategy that you will make your decision and if you are playing by competition or by contributing to the game for all players, that is how I define RPG.</td>
<td>RPG as an interesting social activity</td>
<td>Psychodrama Theory</td>
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</table>
always had this, to see that the game is good when I do not see the time go by. I think the game is very good, of course, improvements can be done but it is perfectly playable. I liked it because the dynamics that have all the interaction with the group.”

CSD2: RPG as an interesting social activity.

CSD1 and CSD2 demonstrate that the experience of participating in an RPG game aimed at water resources management was a fun and interesting activity, which enabled social interactivity and communication between players in a relaxed way.

This phenomenon can be explained by the fact that games offer several means for users to express themselves, explore the world, and seek self-recognition [2], a positive and great experience for players. According to [23], people continue to play if they have an optimal experience, therefore, the ideal experience in games is related to the psychological state of flow theory.

[24] defines flow as the state in which people are intensely involved in an activity and nothing but the activity seems to matter. The flow can be used to measure the strength of the players’ intention to continue playing.

The anchoring “Psychodrama Theory” and the CI “RPG as an interesting social activity”, originated from the speeches related to question 7 (Table I, we developed CSD3).

“I would define it as a strategy game where it is necessary to analyze the strategy that you will make your decision and if you are playing by competition or by contributing to the game for all players, that is how I define RPG. They could be collaborative or competitive, but generally, the person assumes a certain role in the game environment and formulates strategies, or to self-benefit, or to benefit the whole team, so you have to make decisions that will influence the environment, or to self-benefit the player, or benefits a team, that is what I mean by RPG. It is a ‘play’ that we assume, a role in a theater, for example, we will assume that role and have to interpret. For me, it is more or less that. It is an imagination game because if you do not have imagination, you cannot play the game, because no matter how much you have the story, and everything depends a lot of you (what you will or not do) and how you will act... then, for me, you must have a pretty good imagination. If I had to explain it to someone who does not know: it is a strategy game because every RPG is a strategy that you follow a path, depending on the profile of your character, that you decide to interpret in the world that the RPG proposes. It is to put yourself in the papers, and for that, you must have sufficient education to understand what to
### Table V: Tabulation of Answers to Question 11 — How do you perceive the other players’ strategies in this experiment?

<table>
<thead>
<tr>
<th>KE</th>
<th>CI</th>
<th>Anchor</th>
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<tr>
<td>My experience was good I liked it because we needed to discuss in groups, having group communication, talking to people, knowing how to deal with society, because that is what is often missing when you deal with society, you will analyze the whole, not only yourself, and it was the part that I liked that I took from the game: working more on the big group, to be able to interpret a problem, knowing how to benefit everybody.</td>
<td>The RPG as an interesting social activity</td>
<td>Flow Theory</td>
</tr>
<tr>
<td>Yeah... it was cool, at first I was, as I said before, I was kind of stuck, but everything went well and it was... I thought it was very dynamic as the rounds went on, as we play.</td>
<td>The RPG as an interesting social activity</td>
<td>Flow Theory</td>
</tr>
<tr>
<td>I enjoyed the experience, I took on different opportunities, on some occasions, different roles. I was mayor, I was an environmental supervisor, I was a farmer, anyway, so we end up. I did not play all possible roles, but we end up knowing the different roles. I think the rotation of roles interesting.</td>
<td>The RPG as an interesting social activity</td>
<td>Flow Theory</td>
</tr>
<tr>
<td>It was really fun. I have played it a few times and it was very different, with all the changes it was fun, it is an activity that we end up having to do for the project, but it is still fun.</td>
<td></td>
<td></td>
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<tr>
<td>You can get corrupt, you cannot get corrupt and that makes it interesting how people play and also the relationship with other players can be in a certain way.</td>
<td></td>
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<tr>
<td>In a controlled environment, I decided to do what I would not do outside of the game, so my strategy was to corrupt those who were corrupt and I made as much money as possible. Of course, I knew that my attitude, an out-of-game context, would not be viable, it would be illegal, but within the game it caused me a lot of fun.</td>
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### Table VI: Tabulation of Answers to Question 13 — What was your role in the game? What did you think about your role?

<table>
<thead>
<tr>
<th>KE</th>
<th>CI</th>
<th>Anchor</th>
</tr>
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<tbody>
<tr>
<td>So, it was something that taught me a lot like that, that we have dealt with it as friendly people, so we have to talk, it is cool.</td>
<td>The RPG as an interesting social activity</td>
<td>Flow Theory</td>
</tr>
<tr>
<td>Because I polluted and gave a green seal, I threatened to fine anyone who produced a lot, I made a ‘mafia’.</td>
<td>RPGs as individualistic strategies and also as an individualistic survival game</td>
<td>Persuasive Simulated Environments</td>
</tr>
<tr>
<td>I was the environmental supervisor twice and after the alderman.</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>I was a farmer and mayor. I thought my role, especially agriculture, was very nice, not so much the mayor because... the mayor yes, I liked my role as mayor.</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>When I was a businessman, I tried to negotiate to the maximum, to generate the greatest possible profit for me, it was my game strategy.</td>
<td>RPG as individualistic strategies and also as an individualistic survival game</td>
<td>Persuasive Simulated Environments</td>
</tr>
<tr>
<td>It was something that taught me a lot, we have dealt with friendly people, so we have to talk, it is cool.</td>
<td>The RPG as an interesting social activity</td>
<td>Flow Theory</td>
</tr>
<tr>
<td>I thought the first time I played, I was the pesticide businessman, and I found very overwhelming because I did not do anything.</td>
<td>RPG as an interesting social activity</td>
<td>Psychodrama Theory</td>
</tr>
</tbody>
</table>

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**CSD3: RPG seen as a play.**

The CSD3 demonstrates that individuals define the “Role-Playing Game – RPG” as a game in which the person plays a character and from this role, the individuals begin to assemble strategies and use the imagination to insert themselves in the game. However, according to [21], the RPG can be defined as a multiplayer board game, in which a series of games are played to determine the winners, then a final game is played in which the winners unite to fight a final opponent.

The definition of RPG as an actor in a play can be justified by the theory of Psychodrama. According to [25], psychodrama is a method that investigates psychological phenomena through action, that is, a therapeutic model that explores dramatic representation, which enables the free performance of roles and their bonds, working to expand them. Because of this, it is believed that CSD3 represents the idea of dramatic action in the individual, in which the individual will come into contact with himself, with his structures and interrelations.

CSD4 was developed based on the anchoring “Persuasive Simulated Environments” and the CI ideas “RPG with individualistic strategies” and “RPG as an individualistic survival game”, originated from the questions 9 (Table III) and 11 (Table V).

“The game is a real representation of the day-to-day situation applied, but what happens a lot of times, we, as players, do not play directly to the environment, to collaborate with all the people. I played looking at my productivity, my financial gain only, that this is something that happens daily, so we cannot say that this attitude is wrong but or right. So, there are players and players, and someone aims at the environment and other aims only at their profit. It is a game, you can do anything. I would not destroy the environment, for example, but in the game, I want to make money and I did have any concern about the environment. The game is a simple choice between making personal agreements, to exempt yourself from fees, reduce prices, etc., in exchange for some personal benefit to spend money. It just became clear to me that the motivation that people is to combine these two things in the exercise of the role that I was. Several people have in
mind only their good, for example, getting money, in various times, I can see the corruption and people who defended a cause continued to defend until the end of the game. So, in a controlled environment, I decided to do what I would not do outside of the game. So, my strategy was to corrupt those who were corrupt and I made as much money as possible. Of course, I knew that my attitude, in an out-of-game context, would not be viable, it would be illegal, but within the game, it caused me a lot of fun.”

CSD4: The game represented a real situation.

CSD4 demonstrates that individuals believe that gambling can represent a real situation in their daily lives. According to [26], people can be persuaded to change their attitudes or behaviors when they simulate their environment, in which behaviors can be rehearsed by creating scenarios that reward and motivate, can allow people to change their attitudes or real-world behavior. A simulated environment provides a safe testing ground for investigating new behaviors and perspectives.

[27] collaborated with [26] in the definitions of ubiquitous learning as a process that arises from situations of interest to the individual, unlike her/his interaction with the environment, occurring in an unpredictable, fragmentary and even chaotic way.

For [27], the individual acquires knowledge through her/his interaction with the environment. However, the learning process occurs only when the person can apply it in future situations, that is when knowledge becomes part of his behavioral repertoire.

VI. DISCUSSION

Based on the speeches and the theoretical concepts, we believe that games, particularly RPG, can help in the learning process of individuals. [7]–[14] corroborate our statement by emphasizing the importance of these games and practical experience in the field of Education. Since it allows individuals various ways to express themselves and communicate with other players.

Besides, we can observe that the RPG can be seen as a theater play, in which they interpret a character, and from a set of rules and a role they are free to set up strategies and imagine their character’s actions. We believe that this is because psychological phenomena through action can represent an idea of dramatic action in the individual that enables the performance of roles and their bonds.

Finally, we believe that people can be persuaded by RPGs to change their attitudes or behaviors when they simulate their environment, allowing people to experience new attitudes or behaviors in the real world safely. Also, this simulation allows individuals to acquire knowledge from the interaction with the environment and other players in an unpredictable, fragmentary, and even chaotic way since the learning process occurs only when the person can apply it in future situations, that is, when knowledge becomes part of its behavioral repertoire.

VII. CONCLUSIONS

This paper presented an analysis of the strategies used by the players of an RPG in the context of water resources. This type of role game is widely used in several areas because individuals have strategies that are close to reality.

In the context of water resources, RPG helps in the process of understanding the problem and how each player thinks, analyzes, observes a situation from his perspective, and, thus, develops strategies that he considers relevant for his role and the game, as a whole.

This case study presented and analyzed the strategies taken by players in the participatory management of water resources, based on data from the state of Rio Grande do Sul/Brazil, and with a focus on the pilot application of the work in the Lagoa Mirim Watershed Management Committee and Canal São Gonçalo, which involves the cities of Rio Grande and Pelotas in southern Brazil.

In this research, we measure the habits of RPG players through a semi-structured interview that was developed by the group to assess the habits and strategies of individuals during the RPG. The application of these instruments occurred in a sample of 16 individuals composed of four professors, seven graduate students, five undergraduate students.

The data were analyzed using the CSD technique, configuring a qualitative and quantitative analysis of a verbal nature that results in one or more synthesis discourses written in the first-person singular that presents the thinking of a group or collective.

As future works, we propose to i) develop a virtual assistant to assist players from discourse analysis, ii) automate the collective subject discourse analysis methodology, and iii) check for changes in the RPG based on the interviewees’ suggestions.

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