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Methodology for building RPG games to raise awareness of interdisciplinary collaboration among healthcare professionals

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Abstract: Problems in communication and fragmentation in teamwork can cause adverse events in health services, including resulting in deaths. The interdisciplinary training of health professionals can bring robustness and quality to hospital work. However, how can we provide experiences that raise awareness of the benefits of cooperation? To achieve this, each team member must have a mature technical-ethical profile, know their role in the team and conflicts must be resolved with in such a way that they become opportunities. Aiming to encourage cooperation, Role Playing Games (RPG) were chosen as they are playful and promote engagement in teamwork. This article presents a methodology for building such games and strategies for developing skills based on roles played in a team. Preliminary results are promising and show that the methodology can be useful in training health professionals.

Keywords: RPG, Cooperative Work, Collaborative Learning, Health Professionals

1 Introduction

In Brazil, the training of healthcare professionals stands as a key strategy for health prevention and control, supporting health services and actions, particularly within the Sistema Único de Saúde (SUS), as asserted by [Costa and Miranda, 2008]. [Gelbcke *et al*., 2012] emphasize that this education should aim to produce professionals with a multiprofessional and interdisciplinary profile. [Vilela and Mendes, 2013] advocate for fostering critical-reflexive thinking, seeking the integration of theory and practice, active professional participation, and the problematization of reality.

However, how is cooperation perceived among professionals during their training? According to [Fewster-Thuente and Velsor-Friedrich, 2008], cooperation is a complex process requiring intentional exchange of knowledge and shared responsibility for the patient. The level of cooperation among healthcare professionals can directly impact treatment outcomes. [Patkar *et al*., 2011], in their article, note that the National Cancer Plan of the National Health Service endorses the interdisciplinary team model for treating cancer patients.

Interdisciplinary fragmentation contributes to numerous medical errors and up to 98,000 patient deaths annually. Approximately 70% of adverse events involving patients are related to a lack of communication among healthcare professionals during treatment, as highlighted by [Fewster-Thuente and Velsor-Friedrich, 2008]. The International Institute of Medicine has proposed measures to improve healthcare delivery, including providing more opportunities for interdisciplinary training, according to [Mackintosh *et al*., 2011].

According to [Klein, 2010], the conventional unidimensional, pragmatic, and biomedical-focused training approach fails to promote the constructive critical thinking necessary for establishing integrative connections between disciplines, resulting in knowledge synthesis. [Mattar, 2013] states that the classical training model does not teach collaborative activities, even though these activities are practiced in games and simulation environments.

This study aims to propose a methodology for developing games that raise awareness among healthcare professionals about the importance of cooperation in their training. Through this approach, we seek to bridge this gap and provide experiences that enable professionals to understand and value interdisciplinary cooperation as an essential part of their professional development. Conducting this study requires an analysis of development strategies that address the question: How can the perception of healthcare professionals in training towards cooperative work in multiprofessional teams be awakened through games developed for this purpose?

The overall objective of the study is to propose a methodology for creating Role-Playing Games (RPGs) aimed at increasing awareness of the importance of cooperation among professionals in an interdisciplinary team. The interventions are designed to provide each player with knowledge of their role in the team, the development of strengths, and conflict mitigation. At the current stage of the research, solution strategies have been defined to target the development of professional competencies and team dynamics, based on theoretical frameworks. A first experiment is being conducted to analyze the effectiveness of the methodology presented.

The remainder of this article is divided as follows: Theoretical Reference in Section 2; Related Work in Section 3; Methodology in Section 4; Proposed Solution in Section 5; Development and Preliminary Results in Section 6 and Conclusion in Section 7.

2 Theoretical Reference

Authors such as [Pype *et al*., 2018], [Seminotti, 2016], and [Lotrecchiano and Misra, 2018] advocate that interdisciplinary teams are examples of complex adaptive systems. Thus, the approach given to them should consider multiple facets and solutions to their dilemmas should be innovative. [Klein, 2010] observes that achieving interdisciplinarity can be done through collaboration, motivated by teamwork projects. Practice-based learning, discovery, games, and dramatizations can also be used to encourage relationships between professionals in learning and professional life. Despite studies on the drawbacks of electronic games, a new trend has emerged since the beginning of the last decade, focusing on studying the positive aspects of games, especially for education, according to [Camilo *et al*., 2016].

According to [Huizinga, 2008], the author of ”Homo Ludens,” games create a ”magic circle” within which the act of playing takes place in a protected and sacred space where rules cannot be violated. The player accepts this system freely and autonomously. [Crawford, 1984] defines the game as a closed formal system with its own rules that subjectively represent a subset of reality, where the fundamental motivation is to learn. Games are a safe way to experience reality and learn through that experience.

Juul [2013] introduces the idea that failures in games lead to players' understanding of previously unknown concepts, contrary to pushing them away; instead, they bring players closer because failures are not situations to be avoided but challenges to be overcome. According to [Koster, 2005], the fun factor occurs when the player learns a new pattern, and there must be a balance between challenges and rewards. If the game is too easy, it becomes boring, and if it is too difficult, it becomes frustrating.

Games inherently operate as structured systems, guiding players to learn new concepts built upon those already well-established and learned. Therefore, [Melero *et al*., 2011] emphasize that the scaffolding process is intrinsic to games, representing the structure of the zone of proximal development and serving as a tool for active learning. [Mattar, 2013] mentions that games can favor content retention through redundancy. Games present the repetition of concepts in a playful manner. They also offer interactive experiences that provide rapid feedback on players' actions, facilitating more dynamic learning processes.

The practice of games such as RPG, which combines playfulness, creativity, and teamwork, can serve as a way to provide learning that helps in role development and the perception that cooperative work is important in interdisciplinary teams, as argued by [Leitão, 2020]. However, the RPG game master must take special care in preparing the setting, adventures, character classes, and narrative development for this goal to be achieved.

A game construction methodology, as demonstrated in [Marques *et al*., 2019] based on neurocognitive theory, can serve as a model for implementing games that act as catalysts in the teaching-learning process. This methodology was the starting point for the construction of the methodology presented in this work.

In [Bejarano *et al*., 2005], team members occupy positions known as roles. Through knowledge of these roles, it is possible to intervene to improve cooperation within the team.[Belbin, 2010] identified nine roles that can be present in a team: specialist, completer/finisher, team worker, resource investigator, monitor/evaluator, coordinator, shaper, implementer, and plant. This study relies on this theory to propose strategies for developing the competencies of members of an interdisciplinary healthcare team to raise awareness of the importance of interdisciplinary collaboration.

3 Related Work

Guerra *et al*. [2022] introduce an RPG game named ConES, aiming to playfully teach software engineering concepts. Two evaluations were conducted with external participants to validate the game's applicability. The assessments resulted in improvements in critical aspects of the game. However, a test with an actual class and a comparison with conventional software engineering teaching methods are pending. This study is not aimed at healthcare professional teams.

Silva *et al*. [2022] propose an RPG implemented as a mobile electronic game called Gorim, designed for water resources awareness. The game allows participants to experience the dynamics of water consumption in industries and plantations and make decisions as entrepreneurs, farmers, and government officials (mayor, councilor, and inspector). The authors plan to test the application with members of the Mirim-São Gonçalo Watershed Committee. They also do not address healthcare professional teams.

Ribeiro *et al*. [2022] employ RPG games (Dungeons and Dragons, Call of Cthulhu, and Shadowrun) experiences to immerse high school students. The idea is to provide tools for constructing a new RPG with roles based on women and their contributions to sciences throughout history. The project is in its final execution phase and do not target healthcare professional training.

The study by [Azevedo *et al*., 2020] presents the RPG game Dengue Side Survival, designed to inform about dengue prevention and control and measures to avoid Aedes Aegypti mosquito infestation. According to the authors, the game integrates elements highly faithful to the current reality of combating the dengue vector mosquito. The game was considered satisfactory in its goal of entertaining and educating. It was not designed for training professionals.

Codá *et al*. [2020] discuss ”O Chamado do Curupira,” an RPG game based on Brazilian folklore aimed at raising awareness about health and the environment. The achieved results were promising, analyzed from participants' discourse during game sessions. It is not intended for training professionals.

Carvalho and Vasconcellos [2023] the restructuring process of the game ”Quem Deixou Isso Aí?” leading to a new game: ”Quem Deixou Isso Aí, De Novo?” The game aims to help the general public identify the risks of toxic agents that can cause poisoning in young children. The research project was based on serious games, health communication, and procedural rhetoric concepts. In

addition to adding the theme of venomous animals, the project also incorporated aesthetic and interface elements inspired by successful entertainment games to enhance the player experience. The game is not a RPG game.

Another research project that underwent restructuring resulting in a new game was [Santos *et al*., 2022] New levels, features, and challenges were developed for version 2.0 of the game Viral.izo. A user experience evaluation was conducted, concluding that the game application was successful, although new insights were gained. It is not either a RPG game.

None of the cited studies involve interdisciplinary teams. In contrast to the cited studies, the current study focuses on developing a methodology for creating RPG games designed for training healthcare professionals within interdisciplinary teams.

4 Methodology

The conducted research is exploratory, aiming to provide an initial understanding of the study object, following [Gerhardt and Silveira, 2009]. It has a qualitative character and comprises a literature review and a case study, based on [Minayo, 2014].

The literature review, based on [Gil, 2002], was conducted to understand the issues that surround the daily activities of an interdisciplinary team. Key points were extracted from the studied texts and used to create a semi-structured interview. The interview was validated by the coordinators of the multiprofessional residency at INCA. It involved professionals from various categories with medium to long work experience in interdisciplinary teams. The data collected were analyzed using content analysis as described by [Bardin, 2016].

Through the literature review, strategies were developed to enhance the development of interdisciplinary team members, aiming to improve the quality of their work through cooperation.

These strategies, along with the interview results, were employed in applying the game development methodology and creating a game that serves as a proof of concept for the methodology. The chosen strategy for the case study involves observing current phenomena when some relevant variables cannot be controlled. It may use direct observation and a systematic series of interviews, among other techniques, as found in [Yin, 2001].

The RPG game created, utilizing the proposed game development methodology (as will be presented in the next section), was applied to a group of interdisciplinary healthcare professionals. Each team member responded to the Jefferson Scale of Attitudes Toward Interprofessional Collaboration, as described by [Freire *et al*., 2018]. The team underwent RPG game sessions, and then the scale was administered again. Initial and final results were compared, and the collected data comprised the outcomes of this comparison, along with feedback from team members in interviews, serving as feedback for the research process.

The RPG game was crafted by adapting a Dungeons and Dragons adventure called ”The Lost Mine of Phandelver”, from [Wizards, 2023], to a medieval and fantastical setting. This decision was made because the intention is not for the game to be a simulation of the daily lives of healthcare professionals where formal concepts and practices are taught. The metaphor was employed to provide experiences that sensitize individuals to collaboration and teamwork, as per the [Santaella and Feitoza, 2009].

Since the research involves experiments and produces results based on human behavior, approval from an Ethics Research Board was deemed necessary. Approval was obtained from the Ethics Research Board of the INCA on December 7, 2023, under code 76165423.8.0000.5274.

The confidentiality of research participants and the option to abandon the research at any time were guaranteed.

5 Proposed Solution

The proposal is a game development methodology aimed at sensitizing healthcare professionals during their training regarding the importance of cooperation in a multidisciplinary team. The methodology, in its current state, can be seen in Figure 1.

According to [Marques *et al*., 2019], the game construction process begins with the underlying theory that provides technical-scientific support for dimensional modeling. The dimensions form the learning itinerary, possessing orthogonality, domains, and magnitudes. In this project phase, the dimensional model, axioms, and attribute matrix are created.

The conceptual project that provides an episodic description of the game in the GDD (Game Design Document), according to [Rabin, 2011], outlines the story, characters, missions, and details about the game rules. In the storyboarding phase, the conceptual project, along with the conceptual art description document of the game, gives rise to the anthology and storyboard, as shown in [Novak, 2010].

The attribute matrix aids in the Attitudinal Survey process, giving rise to the attitudinal scale that illustrates the desired state changes for each role based on their strengths and weaknesses. It also relates roles with their counterparts in conflict opportunities. The storyboard and canonical events feed into the computational formalization phase, which, in turn, results in the architecture document. This document lists and explains all technology-related aspects involved in crafting the game.

Through applied gameplay, behavioral observation can be conducted, giving rise to cooperation scale tests and *post-mortem* analysis. The cooperation scale measures how much the team has advanced in its cohesion. The post-mortem is a semi-structured interview capturing the gameplay experience from the participants.

5.1 Axioms

To acquire the axioms, semi-structured interviews were conducted with healthcare professionals possessing experience in interdisciplinary teams. There were five female participants, all working at INCA, and they

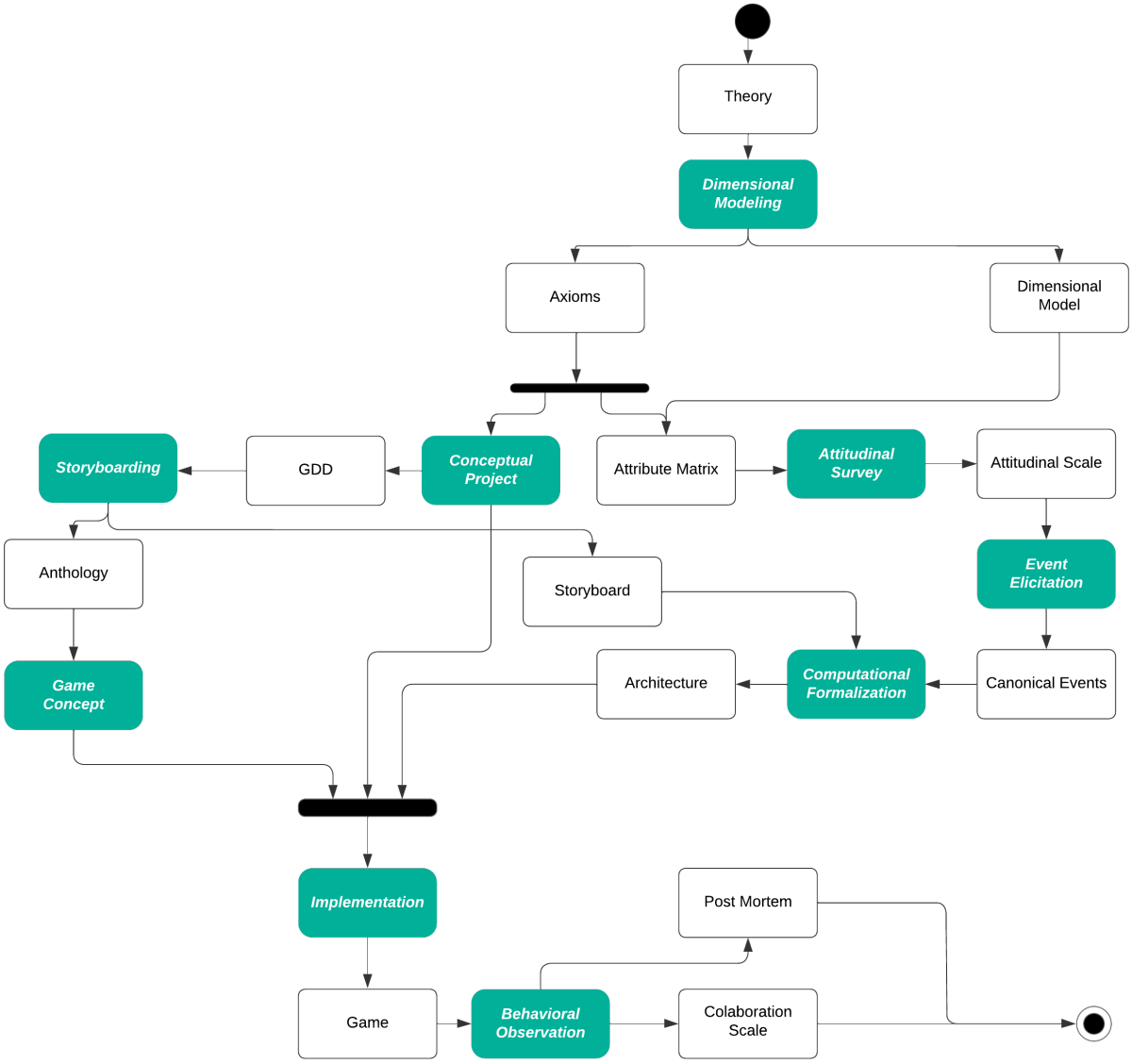

Figure 1. Game construction methodology

have experience working in interdisciplinary teams. All interviewees have more than 10 years of experience.

As a result of content analysis [Bardin, 2016] applied to the interviews, categories and their current status were identified and summarized as follows:

- Training of health professionals and interdisciplinarity: gaps in professional training curricula concerning interdisciplinarity
- Importance of interdisciplinarity for patient treatment: need to reformulate health work activities to include interdisciplinarity
- Interdisciplinarity and hierarchy: power relations in health service environments must be reviewed so that a greater degree of protagonism and collaboration can be achieved
- Institutional coordination and infrastructure for interdisciplinarity: need to develop management and infrastructure policies to enable a collaborative environment
- Characteristics of a professional in an interdisciplinary team: humility, empathy, spirit of collaboration, and respect for others. These skills can be developed
- Features of communication in an interdisciplinary team: respectful, frequent, bilateral, objective, and focused. These are features that can be achieved with training

Aguilar-da Silva *et al*. [2011] observe that in various countries, experiences in health education with an interdisciplinary approach consistently change the profile of trained professionals. This team-integrated training tends to break with the biomedical model, giving graduates a more holistic view of health treatments.

In the same line, [Batista, 2012] reflects on the need to extend university education beyond specific professionalization to address issues in the teaching proposal, leading to changes in the attitudes of teachers and students, with integration and interdisciplinarity as the driving forces.

According to [Ceccim, 2004], one of the challenges of interdisciplinarity lies in establishing a work environment where there's an acknowledgment that healthcare necessitates a team of diverse professions collaborating and continuously constructing shared practices. The same author [Ceccim, 2017] adds that an interdisciplinary ethic and interprofessional training should be proposed to break with disciplinary approaches. He argues that the challenge is to organize professional acts and work processes in each team from a patient-centered perspective and align institutional conduct accordingly.

According to [Arruda and Moreira, 2018], the greatest challenge of interdisciplinarity is not to deny professional specificity but to try to establish bridges between professional and interprofessional logic. This interprofessional logic involves the need to share knowledge, specialties, experiences, skills, and intersubjectivity.

Lima *et al*. [2018] outlines three challenges faced by healthcare teams: overcoming the compartmentalization of knowledge, expanding the approach still based on the biomedical model, and overcoming fragmentation in healthcare due to hierarchical systems.

The factors highlighted by the interviewees (in their own words) as elements that are missing to achieve interdisciplinarity in their healthcare services are also summarized as follows. These factors confirm the categories and outcomes and corroborate with the cited literature.

The interviewees are identified by their areas of expertise.

- Dentist: Knowing and respecting the importance of what the other does, fluidity of protagonism, lack of institutional support
- Nutritionist: Importance of teamwork, recognizing the role of others, physical barriers, lack of time, lack of shared medical records
- Physiotherapist: Sufficient number of personnel
- Doctor: Respect for the knowledge of others, insecurity of thinking that if you share knowledge, the other will take possession of it
- Nurse: It´s egos, lack of empathy, biomedical model

The categories and factors obtained form the dimensions from which axioms representing the daily reality of healthcare professionals, regarding interdisciplinarity, will be derived.

5.2 Awareness-raising strategies

When team members know exactly what is expected of them, they tend to act more cohesively. Knowing one's role in the team can be crucial for each member to respect hierarchical relationships and contribute their knowledge. Thus, cooperation can be strengthened by optimizing teams with well-defined roles, as advocated by [Gardner, 2005], [Mickan and Rodger, 2000], and [Fjeldstad *et al*., 2012].

Behaviors and attitudes demonstrated by roles in a team can generate friction due to the intrinsic nature of each role. Some roles may have antagonistic characteristics at certain stages of the work process that can conflict. These technical conflicts should be minimized as much as possible, according to [Gardner, 2005], [Liberati *et al*., 2016], and [Brown *et al*., 2011].

All professionals in a team possess skills that should be encouraged, while weaknesses should be addressed to minimize them. This development can be more easily achieved with the help of colleagues who have affinities and can support individuals, according to [Gardner, 2005], [Harvey and Koubek, 2000], and [Lindeke and Sieckert, 2005].

In RPG games, players assume roles based on fantasy worlds, working together in teams to embark on adventures that are ultimately problems to be solved for success, as seen in [Dragons, 2014] and [Jackson *et al*., 2008]. This research proposes individual development through situations that provide interactions with other team members to maximize professionalsśtrengths and minimize weaknesses. Additionally, it proposes revealing the characteristics of roles (defined by Belbin) to team members so that they are aware of their importance and limitations in the team. Finally, it suggests minimizing friction between the roles occupied by team members. To achieve this, an RPG game is used to create situations where conflicts are resolved through cooperation between roles with antagonistic characteristics.

Each role presents strengths (virtuous characteristics for team cooperation) and weaknesses (undesirable characteristics). It is important to propose situations in which strengths are developed for optimal teamwork. The first intervention strategy is to expose team members to situations where strengths can be developed and weaknesses minimized. In these adventures, individuals will be accompanied by like-minded colleagues who will help them achieve the proposed goal, providing an opportunity to develop their competencies and change attitudes considered negative for teamwork.

Roles that complement each other also present antagonistic characteristics that hinder interdisciplinary work. In this sense, the second intervention strategy is to mitigate conflicts between complementary roles. This can be achieved through conflict mediation.

Table 1 shows the roles and their main strengths and weaknesses according to Belbin. It also demonstrates complementary roles that have antagonistic characteristics.

In RPG games, characters serving as avatars for players have characteristics or attributes defining the character's participation in each adventure action. These attributes in Dungeons and Dragons RPG are strength (measuring physical power), dexterity (measuring agility), constitution (measuring endurance), intelligence (measuring reasoning and memory), wisdom (measuring perception and intuition), and charisma (measuring force of personality), according to [Dragons, 2014].

For the third strategy, it is necessary to define certain dimensions within which roles are positioned. These dimensions become player attributes, similar to dexterity, and strength, among others. The dimensions are taken from role descriptions as their main characteristics. Table 2 shows these attributes and the initial scores each role has. Scores were defined in this study based on the Dungeons and Dragons Player's Handbook, according to [Dragons, 2014]. The game should act as a self-awareness tool, providing

Table 1. Roles, strengths, weaknesses and complementary

Roles	**Strengths**	**Weaknesses**	**Complementary**
Plant	Creative, open-minded	Pays little attention to trivial matters, may not communicate effectively	Monitor Evaluator, Shaper
Monitor Evaluator	Sober, strategic	Very critical, uninspiring	Plant, Resource Investigator, Completer Finisher, Teamworker
Co-ordinator	Mature, confident	Can be manipulative, can delegate too much	Plant, Resource Investigator, Completer Finisher, Teamworker
Resource Investigator	Extroverted, enthusiastic	Too optimistic, loses interest when enthusiasm ends	Implementer, Completer Finisher
Implementer	Practical, reliable, efficient	Can be inflexible, can be slow	Plant, Resource Investigator, Teamworker
Completer Finisher	Diligent, perfectionist	Anxious, reluctant to delegate	Plant, Resource Investigator, Teamworker
Teamworker	Cooperative, diplomatic	Can be indecisive, avoids confrontation	Shaper, Monitor Evaluator, Specialist
Shaper	Challenging, dynamic	Can be provocative, can be insensitive	Plant, Resource Investigator, Completer Finisher, Teamworker, Specialist
Specialist	Obstinate, dedicated	Can be very technical, can be closed minded	Teamworker, Shaper

Table 2. Attributes and initial scores

	Creativity	Logic	Objectivity	Advertising	Efficiency	Quality	Empathy	Focus	Know-how
Plant	10	3	3	5	3	3	5	3	5
Monitor Evaluator	3	10	5	5	5	5	3	5	5
Co-ordinator	5	5	10	5	5	5	5	5	5
Resource Investigator	5	3	3	10	3	3	5	3	5
Implementer	5	5	5	3	10	5	3	5	5
Completer Finisher	5	3	3	3	5	10	5	3	5
Teamworker	5	3	3	5	3	3	10	3	3
Shaper	3	5	5	5	5	5	3	10	3
Specialist	5	5	5	5	5	5	3	3	10

players with insights into who they are and what they may not know.

The game master's created adventure should encompass these three strategies, providing situations where reflections can take place, allowing participants to realize the importance of cooperation among team members for the success of the adventure and, more broadly, for the construction of higher-quality work routines.

6 Development and Preliminary Results

A first experiment was carried out using the adventure entitled "The Lost Mine of Phandelver" [Team, 2014]. The adventure provided resources for the construction of the story, characters, missions, and details about the game rules. Based on this adventure, objectives (to be achieved by the participants), challenges, also known as canonical events (situations proposed for the achievement of objectives), and test points (factors that can demonstrate the achievement of objectives) were defined. The axioms, objectives, canonical events, and test points can be seen in Table 3. Story points were also added, indicating to the game master where, within the story, each canonical event should occur.

An important step in building the game is creating the characters. At this point, players can incorporate real-life characteristics such as their personalities, professional skills, and ethical orientation into their character composition by defining their races, backgrounds, and classes. They can also define equipment, proficiencies, and abilities. For instance, a participant who is a nurse might opt to embody an arcane mage within the game, endowed with healing spells and the capability to concoct potions and elixirs, along with possessing equipment such as a first aid kit.

Figure 2 shows a gaming session of the experiment being conducted. The tokens represent the characters. There are four player characters and one enemy character (a goblin

Table 3. Experiment Planning

Axiom	**Objective**	**Challenge**	**Test Point**	**Story Point**
Importance of interdisciplinarity	Union of skills to complete a task	To kill a monster, a combination of powers from two or more players is necessary	The team can kill the monster with the combination of powers or succumb	Goblins' attack on the road
Importance of interdisciplinarity	Exchange of ideas about an enigma to be unraveled	The enigma that opens a door can be discovered in the player's discussion	The team discuss the resolution of the enigma and deciphers it	Entrance of the Goblins' cave
Coordination	Team coordination on the division of complementary tasks	The group can decide that not everyone will go into battle or that only warriors will battle while mages make life-restoring potions	The team discusses the division of tasks and reaches an agreement	Goblins' attack in the cave
Interdisciplinarity and hierarchy	Team leadership can be elected or shared	The group can decide to make a player a leader or share leadership in all decisions	A leader is elected or decisions are always shared	Throughout the adventure
Coordination	Actions of each team member can be individualized or collectivized	A member can decide to act alone or can consult the group about the best action for the team's well-being	Team members discuss how they will act or do not discuss	Throughout the adventure
Characteristics of a professional in an interdisciplinary team	Team actions may take into account only the moment or the main mission objective	A member of the team may decide to take a shorter path temporarily or may continue on the path to the castle, which is the mission's objective	The team decides to take a shorter path or continue the journey to the objective	After the Globins' attack, the group can go to the cave to save Sildar or go to Phandalin to deliver your belongings and recover from the battle
Characteristics of communication in an interdisciplinary team	Conflict resolution	How the team deals with rivalry between two or more members	The team splits or remains united	Throughout the adventure

behind the foliage). The moment depicted in the figure was when all players joined forces to defeat the goblin that fatally attacked one of the team members. Everyone ran to the cart where the character was injured (note the bloodstains on the ground).

Four healthcare professionals participated in the experiment (a physiotherapist, a nurse, a pharmacist, and a pediatric physiotherapist), identified as p1, p2, p3, and p4. All participants are male, with an average age of 43.5 years. The results presented here are preliminary, as the experiment has not yet been concluded.

The Jefferson scale questionnaire was filled out by the participants before starting the game sessions and after the second session. The consolidated scores obtained were 100 on the first questionnaire submission and 103 on the second. There was, therefore, a 3% increase in the score between the first and second submissions. Although this increase was not substantial, it should be considered that the experiment has not been concluded. Therefore, a more promising result is expected at the end of the research.

Participants also answered a semi-structured interview aimed at determining their perceptions of their participation in the game. From these interviews, relevant feedback was obtained about the gaming experience and used as input for the research. In general, participants enjoyed the gaming experience, and the interviews showed that there was a sensitization, in some cases, or maturation in others, regarding interdisciplinary collaboration and teamwork, as seen in their responses when asked if there was any moment when working as a team helped in the mission.

However, it is important to note that the gaming experience can be improved in some aspects. Using a graphical platform, the Foundry Virtual Table Top, brings some undesirable effects, either due to the participants' lack of expertise in using it or the impact on the performance of the machines used by some of them.

Additionally, it should be considered that not all participants feel comfortable with the gaming style, either due to shyness in a role-playing game or the game's dynamics, which can sometimes be faster or slower, and also the difficulty in adapting to the power relationship established between the game master and the participants.

Some participants' speeches that demonstrate these aspects are shown in table 4.

Participants also responded to the Self-Assessment Inventory for Teamwork, based on Belbin's theory [Silva, 2024]. This questionnaire consists of 7 questions with 9 responses each. For each question, the participant must distribute a total of 10 points among the answers that they believe most accurately describe their behavior and thinking. The score is then calculated for each role, defining how each one works in a team.

The results, shown in the Figure 3 graph, indicate the formation of a team with a harmonious configuration, as there are no conflicts between similar roles.

Although there are complementary roles such as Completer Finisher(p3) and Shaper (p1) and Completer Finisher(p3) and Monitor Evaluator (p2), no conflicts were observed for which intervention was necessary.

Figure 2. Game scene

Table 4. Participants' speeches

Aspect	Participant	Speech
Game's contributions to collaboration	p1	Yes. Like the support of other members in letting my severely injured character rest.
	p3	Yes, all moments.
Game platform issues	p1	The platform is a bit complicated and not very intuitive for those unfamiliar with it; however it is a creative way to make the RPG gaming experience more dynamic.
	p2	The game is great, but internet instabilities hindered me a bit in the better visualization of the game.
Game experience issues	p1	Shyness, but it's something I've been working on for many years.
	p3	I like games; however, I found the first two sessions monotonous; the master explains a lot, and we get lost in reasoning. I prefer something that requires more of my participation.
	p4	Excuse me, but I just think this master should be a little more polite with us.

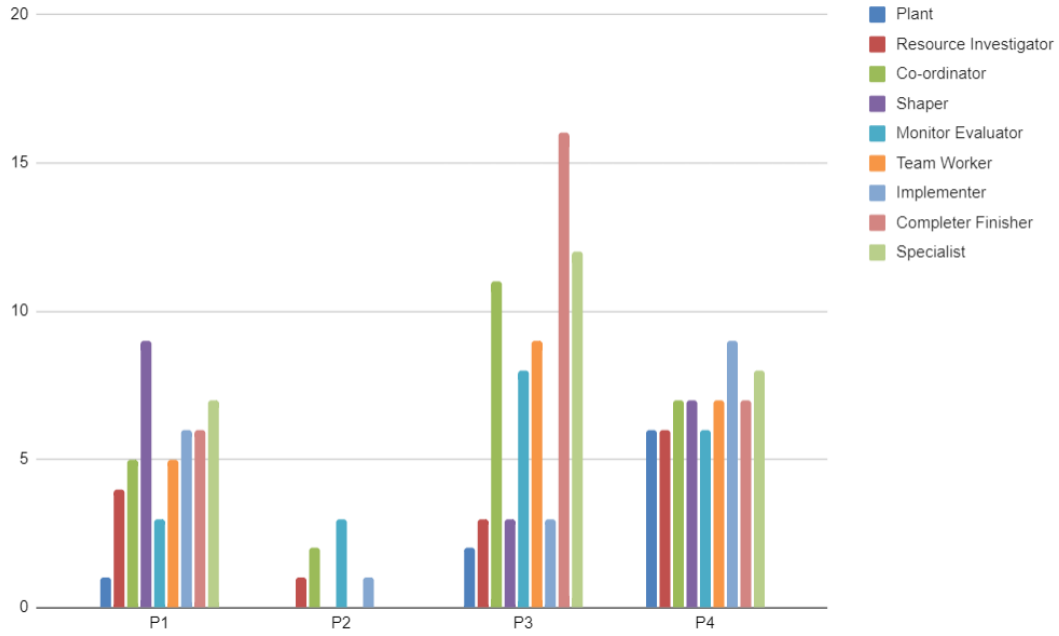

Figure 3. Players roles

7 Conclusion

Insufficient attention has been directed towards the training of healthcare professionals regarding awareness of interdisciplinary cooperation. Games can be a relevant way to provide integrative experiences, engaging students in cooperative work.

This study proposes a methodology for constructing a game aiming to sensitize healthcare professionals to work cooperatively in a multiprofessional and interdisciplinary manner. It also presents competence development strategies based on Belbin's theory of team roles.

From preliminary results obtained in the first experiment, the study observed a subtle change in sensitivity to interdisciplinary collaboration. The roles of participants were also defined, according to Belbin, to develop workers more aware of their capacities and limitations. Finally, points for improving the gaming experience were identified through participant evaluations.

This study aims to answer the research question and advance the knowledge acquired to provide solutions for the education of healthcare professionals, sensitizing them to interdisciplinary collaboration and possibly promoting some

degree of improvement in the quality of health services.

8 Declarations

Authors' Contributions

Márcio da Silva Camilo: conceptualization, data curation, investigation, methodology, writing-original draft. Claudia Lage Rebello da Motta: conceptualization, supervision, writing-review and editing.

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