A Systematic Mapping on Player’s Profiles: Motivations, Behavior, and Personality Characteristics

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Abstract
Digital games have become part of the daily life of a large part of the world population, reaching audiences of different ages, genders, and cultures. Games are also becoming an increasingly explored research topic in Human-Computer Interaction (HCI), and several studies have sought to deepen the knowledge about players, identifying individual differences. Although the literature is rich in works that typify and classify players, the lack of objective comparisons can make it difficult to adopt such types to support game design or future research. Thus, this research investigates players’ taxonomies and typologies regarding their motivations, behavior, and personality characteristics, analyzing how they explore these traits. We conducted a systematic mapping of the literature and analyzed 19 studies that propose or update players’ types, observing how they explore the above mentioned traits. The main contribution of this paper is to offer an overview of the identified taxonomies and typologies, comparing them and mapping their attributes and applications. Such knowledge is a tool for designing games and gamified systems and can support game designers to promote engagement and motivation in complementary ways in their games. It also allows researchers and practitioners to compose a multidimensional view of the different players’ types.

Keywords: player types, player profiles, typology, taxonomy, engagement, player motivations, player behavior, personality characteristics, digital games, gamified systems

1 Introduction
In recent years, digital games have become part of the routine of a large part of the world’s population, reaching audiences of different ages, genders, and cultures (Rozen, 2020). Consequently, games have become an increasingly explored research topic in academia, both globally and nationally. In Human-Computer Interaction (HCI) and related disciplines, such as Games User Research (GUR), for example, several studies investigate various issues related to games and their potential for the most diverse applications, which go beyond the single focus on entertainment.

Examples of this are studies that deal with the use of games in health (Orji et al., 2017) (for example, for rehabilitation (Adisusilo et al., 2020; Alankus et al., 2010)), in tourism (Shen et al., 2020) and in education (Mendoza and Baranaukas, 2019; Miranda et al., 2019), with special emphasis on edutainment (Aksakal, 2015; Wang and Nunes, 2020) and game-based learning (Bahrini et al., 2020), in addition to the growing adoption of gamification, which applies game elements in different types of applications and contexts (Bitrián et al., 2021; Toda et al., 2020).

Much of the success of purpose-built games like the ones mentioned above depends on player engagement (Hookham and Nesbitt, 2019; Orhan Gökşün and Gürsoy, 2019; Adisusilo et al., 2020). Engagement is a quality of user experience characterized by the depth of an actor’s investment when interacting with a digital system (O’Brien and Cairns, 2016), which is more than being satisfied with such a system (Cairns, 2016). Affective engagement – which includes a sense of pleasure, immersion, and spontaneous flow – is fundamental for players to follow the gameplay complexity so that fun and high-level engagement correlate to the gaming experience itself (Gee, 2005; Voulgari and Komis, 2010).

No wonder this construct has aroused increasing interest in the HCI community, and many studies have explored its nature and definitions and ways to increase and measure it, inside and outside the gaming context (O’Brien et al., 2018; Wiebe et al., 2014; Martins et al., 2020; de Souza Filho et al., 2019; Vasconcelos et al., 2018). Studies investigating more general issues surrounding games are common, such as their effects, strategies, and evaluation methods, and which elements make up a successful game – for example, (Santos et al., 2015; Evelin et al., 2016; Silva et al., 2020; Carneiro et al., 2019; Borges et al., 2020).

However, despite the increasing knowledge production in this domain, making a good game is not a trivial task. Game design is something intrinsically complex (Rozen, 2020). The study and creation of high-quality games capable of promoting engagement and achieving their purposes require knowledge and understanding of players, which leads to the need to understand their behaviors, motivations, and characteristics (Drachen et al., 2018). Comprehending the user and their behavior is an essential part of the HCI processes (Barbosa et al., 2021), and the same is true for the study and design of games (Drachen et al., 2018; MacKenzie, 2013).

Several studies have identified and classified players’ traits and types according to their motivations, behavior, and emotions while playing (Bartle, 1996; Yee, 2007; Yee et al., 2011; Bateman et al., 2011; Brühlmann et al., 2020; Nacke et al., 2014). Bartle (1996) was one of the first to document specific behaviors in different types of players. Since then, many other researchers have invested efforts in detecting motivational profiles and how they impact playing. Some re-
searchers have even searched for typological classifications in other areas, such as Psychology, Anthropology, and Sociology, that can be used to understand the players’ profiles (Paulin, 2013). More recently, researchers have started investigating scientifically sound approaches to identify player types, demonstrating that game effectiveness may be correlated to player types (Van Gaalen et al., 2022).

Although the literature presents several works that typify and classify players through different criteria, to the best of our knowledge, no research compares these proposals in terms of the differences and similarities of the behavioral and motivational profiles described in the several existing classifications. Thus, the present research aims to investigate the taxonomies and player typologies proposed in the literature regarding their motivations, behavior, and personality characteristics – elements directly related to the player’s engagement and experience – and survey how they explore these traits comparing them.

To this end, we carried out a systematic mapping (SM) of the literature (Petersen et al., 2015), identified and analyzed 19 classifications that propose or update types of players based on the parameters mentioned above. The main contribution of this work lies in offering an overview of players’ taxonomies and typologies. We compare their target genre, organization, classification strategy, and categories and map their attributes and applications. Such knowledge helps promote engagement and motivation in complementary ways and allows researchers and practitioners to look at the player with a multidimensional view of their engagement and motivations.

We highlight that our purpose is not to propose a classification, discuss the effects of games on certain types of players, or demonstrate any relationship or inferences related to types of players and their context and behavior in real life. We present a systematization of knowledge about player profiles that, although not exhaustive, can inform researchers and practitioners studying human factors in digital games and gamified systems, regarding the three aspects that enable the knowledge and typification of players: motivation, behavior, and personality characteristics, which together make up the focus of this work. Before, however, it is necessary to establish the difference between taxonomy and typology, two central terms for the research.

2 Background

In this section, we discuss concepts related to studying types of players and investigating their differences. We approach user engagement, a fundamental construct for the success of digital games and gamified systems, regarding the three aspects that enable the knowledge and typification of players: motivation, behavior, and personality characteristics, which together make up the focus of this work. Before, however, it is necessary to establish the difference between taxonomy and typology, two central terms for the research.

2.1 Is it a Typology or a Taxonomy?

Despite being treated as synonyms, typologies and taxonomies refer to different theoretical approaches and modes of information organization (Bailey, 1994). Part of this confusion is attributed to the fact that a typology is a theoretical approach rather than a classification system which is often misinterpreted and wrongly developed (Doty and Glick, 1994). For Bailey (1994), typologies are conceptual classification modes, which presuppose arrangements for the elements of a set in multidimensional structures (Bailey, 1994; Smith, 2002).

Units that form a typology are called types and bring together concepts. They do not have an empirical basis for their proposition and are more linked to the notion of an ideal type that models something (Weber, 1949). Hence, the proposition of a typological classification is an a priori, and deductive approach (Da Silva, 2013). Using typologies can be helpful for understanding complex scenarios and proposing generalizations as a previous step in establishing hypotheses. However, some disadvantages must be considered, such as the fact that the types are neither exhaustive nor mutually exclusive; the arbitrariness of the criteria often adopted; and its descriptive rather than explanatory or predictive character (Bailey, 1994; Smith, 2002). In the context addressed by this work, the types proposed by Nacke et al. (2014) constitute an example of typology.

Taxonomies, in turn, are empirically based ways of classification (Bailey, 1994). The taxonomy construction is done inversely compared to typology since the taxonomies derive from sample observations and measurements and an associative arrangement of the elements to be classified as possible. According to ANSI/NISO Z39.19-2005 (R2010), taxonomies consist of controlled vocabularies whose terms establish a relationship with each other and have some hierarchic level (NISO, 2010).

A taxonomy can be understood as a knowledge organization system. Its use can support one, or a combination of more than one, of these three main functions: indexing, retrieval or organization, and navigation (Hedden, 2010, p.55). Since the terms result from an observation of the general data set, one of the advantages of building and adopting a taxonomy is the consistency of the classification (Hedden, 2010). An example of a taxonomy related to player classification is in the work of Tondello et al. (2017), who proposes a taxonomy related to player preferences.

This disambiguation of terms is essential for the analysis of classificatory studies. It establishes a basis for interpreting their nature and underlying concepts, allowing the comparison of different studies. Some of the papers analyzed in this work confuse this terminology, resulting in methodological issues: sometimes, what was called a typology was, in fact, a taxonomy, for example.

The work of Bartle (1996) exemplifies the term confusion problem since it is easily observable that most of the works that reference it call their types a taxonomy, while countless others define them as typology. Once the terms typology and taxonomy are not synonymous, we use the word “classification” as an umbrella term to refer to both throughout this paper.
2.2 Study of player types

Besides being an essential tool for the design of games and gamified systems, the knowledge of specific types of players can support game designers and researchers. It offers a basis for the study of the player’s experience, motivational factors, and specific goals, for example, learning or segmenting strategies (Fortes et al., 2018). Several researchers have made efforts over time to propose and update player models, typologies, and taxonomies – e.g., (Yee, 2006; Nacke et al., 2014; Bateman et al., 2011; Tondello et al., 2019).

The study of player types began with the work of Bartle (1996), still in 1996, who proposed what is usually considered the first typology of players based on behaviors or approaches presented during the game. He built the work from the observation of discussions of experienced MUD players about motivations for playing such games. The author analyzed the players’ comments and identified four distinct groups of motivations, relating them to types of players: the achievement, players who pursued winning points and leveling up their character in the game; the explorers, whose objective was to explore the game in search of understanding its mechanics and finding possible bugs; the socializers, whose interest is focused on socializing with other players; and finally, the killers, which mainly aim to attack other players and destroy their characters. Such types were based on four players’ interests: interacting, acting, players, and game world. Each type identified was related to at least two of these interests – for example, achievement is interesting in acting in the game world. In contrast, socializers are interested in interacting with other players. A weakness of Bartle’s work, however, is that the assumptions adjacent to the types have not been empirically tested, which makes this an informal model (Yee, 2006; Nacke et al., 2014).

Despite the lack of validation, the Bartle model became seminal for fostering the first investigations into this field in later years, as its types became widely known and were the basis for several other studies (Nacke et al., 2014; Hamari and Tuunanen, 2014; Tondello et al., 2017). Yee (2006), for example, built quantitative measures on the foundations of Bartle’s qualitative work to create an empirical model for MMORPG which revealed ten motivation subcomponents grouped into three components: achievement, social and immersion. Among other relevant contributions, Yee’s work made it possible to raise questions about the generalization that is usually made of Bartle’s types, constructed from the comparison between specific scenarios subject to biases (Nacke et al., 2014).

Subsequently, studies were undertaken on other grounds, aiming to overcome possible limitations derived from Bartle’s original work, as is the case of Tondello et al. (2017), who propose a taxonomy of player preferences based on game elements and styles to play. The correlation with personality profiles already mapped in studies in the field of psychology was also used for the categorization of players: for example, Yee et al. (2011) used the model Big Five (Goldberg et al., 1999) to insert the players in profiles. The model in question establishes five personality factors, with which the author relates the players, namely: extroversion, affability, conscientiousness, emotional stability and openness to experience. Through game data and questionnaires, Yee proposed a way to study them through a set of archetypes. Another strand of study makes efforts to create tools that help the automated identification of different player profiles. Although not the focus of the present work, the relevance of such research is highlighted, e.g., (Gow et al., 2012; Drachen et al., 2009).

Thus, it is possible to notice different strategies for identifying player types and profiles. However, until the conclusion of the present research, no works were identified that systematically addressed the composition of an overview of existing studies, except for the work by Klock et al. (2016), who performed an SM and identified ten classifications of players.

Although it shares similarities with the research reported here, the work of Klock et al. (2016) differs in relevant points, especially: the focus on identifying studies that used player classifications, while this one focuses on studies that propose classifications, in addition to a different focus on searches – by using a string and more general selection criteria, the authors admitted works with different purposes (for example, the proposition of computational clustering techniques), while we restricted the search to classifications describing different player dimensions, a perspective that seems to have expanded the scope of the results. Furthermore, Klock’s work was conducted in 2016, which opens a large window for new publications. The works identified by Klock et al. that were not among our results were included in the filtering process of the present work, as reported in Section 3.

2.3 Players’ engagement, motivation, and profiles

User engagement is an essential element of interaction, manifested by a range of individual states such as attention, intrinsic interest, curiosity, and motivation (Chapman, 1997; Laurel, 2013; O’Brien and Cairns, 2016). Engagement can be seen as the “emotional, cognitive and behavioral connection that exists, at any point in time and possibly over time, between a user and a resource” (Atfield et al., 2011). This construct is directly related to the level of investment someone employs to interact with a digital system - including behavioral, temporal, cognitive, and emotional investment (O’Brien and Cairns, 2016).

Thus, as a quality of user experience characterized by the depth of such investment, engagement is more than “mere” satisfaction: it is believed that the ability to engage and maintain engagement in digital environments can generate positive results. For several areas, such as citizen participation, electronic health, e-learning and others (O’Brien and Cairns, 2016; O’Brien et al., 2018). Thus, there is a broad understanding that designing engaging experiences are necessary for any interactive design to be considered appropriate and
successful (Doherty and Doherty, 2018).

In the gaming industry, engagement metrics are widely used. Large world-renowned companies have already published whitepapers on the subject. Facebook, for example, presented the results of a survey where it highlights the power of engagement to maintain the use of games and, consequently, increase revenue (Facebook IQ, 2019). Google similarly linked engagement with the “inclination to spend” in apps of this genre (Google, 2019). Activision Blizzard also highlighted that engagement means earnings for the game (Blizzard, 2021).

Engagement is a concept of interest in player-game interaction, as it contributes to different constructs related to the game and the player experience (Borges et al., 2020; O’Brien and Toms, 2008), being closely related to other constructs, such as immersion and presence (Cheng et al., 2015; Lessiter et al., 2001). Several researches have investigated engagement through typologies – e.g., (Brühlmann et al., 2020; Shen et al., 2020; Calegari and Celino, 2018). It is common to fraction the study of engagement to trace factors that cooperate to engage players, or that can determine how they interact and relate to a game, noting especially the player’s motivations, his behavior and personality traits or characteristics (including preferences). Such factors – which constitute the focus of this work – stand out for cooperating individually and collectively for user engagement and can shape their experience with a game or gamified system.

O’Brien and Toms conducted a literature review and identified a certain equivalence of definitions about engagement. According to the authors, engagement is a cognitive, affective, and behavioral state of interaction with a computer application that makes the user want to be there (interacting) (O’Brien and Toms, 2010). Thus, engagement occurs in three steps: engagement point, which is the beginning of the interactional process; engagement which comprises the interaction itself; and disengagement, which comes with the end of interaction. Game designers usually seek to keep the user in the moment of engagement for large amounts of time and minimize the process of disruption (disengagement).

Although necessary for the success of a game, if abused, this resource can lead to an exaggerated engagement, which can cause serious issues such as Gaming Disorder3. Understanding engagement in the universe of digital games is important not only to avoid and denounce abusive and unethical practices in game design, but also to reveal the various parameters that guide human motivation itself, in a positive way.

The study of motivation is relevant to understand engagement because making players feel inclined to return to a game and continue playing is critical to its success (Melhart et al., 2019). Motivation – a central theme in the study of player-game interaction – is widely considered a determining factor of player preferences and their Brühlmann et al. (2020) experience and is also related to user behaviors towards games. Thus, the study of motivation allows establishing associations between personality and behavior of users within the game – as done in the classifications of Bartle (1996) and Yee et al. (2011), for example. The first is based on motivations, and the second goes further by also relating personalities and behaviors.

The player’s behavior, in turn, is directly related to what types of stimuli are presented to him during the experience (Calegari and Celino, 2018). At the same time, personality is a fraction of the engagement that strongly influences the player’s involvement with the game. By identifying players’ personalities and associating other factors, it is possible to design for a better and more personalized experience (O’Brien and Cairns, 2016).

Psychology studies have correlated motivation with different aspects of player profiles while engaged in gaming, including their personalities, gameplay behavior, and enjoyment (Liu et al., 2021). For example, achievement, affiliation, and power motivations – which are influential in motivation psychology – can be matched with existing player types (Liu et al., 2017). Because of that type of relationship, different works in the literature have been using a range of subjective and objective techniques for identifying player motivation, seeking to identify the profile that best describes a given player, which may impact the game design (Nacke et al., 2014).

Given the above, the present work contributes to the game user research, focusing on the overview of players’ classifications according to their motivations, behavior, and personality characteristics. This perspective helps to understand the relevance and nuances of studies related to motivation and engagement in digital games, and how they can be applied to game design.

3 Gaming disorder is defined in the 11th Revision of the International Classification of Diseases (ICD-11) as a pattern of gaming behavior (“digital-gaming” or “video-gaming”) characterized by impaired control over gaming, increasing priority given to gaming over other activities to the extent that gaming takes precedence over other interests and daily activities, and continuation or escalation of gaming despite the occurrence of negative consequences. The full description is available at: https://icd.who.int/browse11/l-m/en/http://id.who.int/icd/entity/1448597234

3 Methodology

To reach the proposed objective for our research – that is, to investigate and systematize the knowledge about the players’ classifications proposed in the literature regarding motivations, behavior, and personality characteristics – we conducted a systematic mapping (SM) of the literature (Petersen et al., 2015). We used the PICOS characteristics (Population, Intervention, Outcome, and Study) (Stone, 2002) as eligibility criteria to help structure the review, select relevant questions and avoid unnecessary searches.

The SM consists of a secondary study method to review primary studies and build an overview of a given area of research, identifying opportunities and research gaps, for example, Petersen et al. (2015); Kitchenham et al. (2010). The SM process followed can be summarized in three phases: planning, conduction and results reporting (Figure 1), which are described throughout this section.

In the planning phase, we composed a research protocol according to the guidelines proposed by Petersen et al. (2015). The protocol comprised the study objectives, the research questions, the search string and bases, and the study selection criteria (Table 1). We listed the following research
questions to be answered through the SM:

1. RQ1: What classifications (taxonomies and typologies) of player profiles are proposed in the literature?
2. RQ2: In what types of academic publications are the player profile classifications published?
3. RQ3: What types of research are conducted to propose player profile classifications?
4. RQ4: How did the studies obtain the proposed classifications?
5. RQ5: How are the classifications organized?
6. RQ6: What are the domains explored by the identified classifications?
7. RQ7: Do the proposed classifications consider elements of games? Which ones?
8. RQ8: Do the studies propose something to help others identify player types?

We specified the selection criteria for the review protocol and reviewed them among the researchers. We used a think-aloud protocol where one researcher described the reasoning of inclusion and exclusion criteria by applying them to one study. After that, we piloted the criteria and determined the level of agreement.

We used four sources to carry out searches for papers: Scopus, PubMed, Science Direct, and Web of Science. We selected these databases because together, they index the ten most relevant journals and proceedings on the topics “Game design” and “Player engagement”, according to the quality score calculated by the Microsoft Academic tool4. From the most relevant venues identified, we selected four control papers (Yee, 2006; Si et al., 2017; Shen et al., 2020; Kahn et al., 2015), based on their quality and relevance to our study.

To compose the search string, we listed keywords from terms and their synonyms identified in a set of articles relevant to the topic (Bartle, 1996; Kahn et al., 2015; Yee, 2006; Busch et al., 2016; Barata, 2014; Xu et al., 2012). These articles were defined by searches on the topic and expert recommendations. The string was iteratively tested and reviewed by three evaluators, using the control papers to ensure its quality. After the revisions, we reached the final version (Figure 2), which captured all the control papers when applied to the four selected bases.

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\text{(game AND player AND ('player motivations' OR ((type OR profile) AND (taxonomy OR classification OR typology))) AND (behavior OR motivation))}
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In the conduction phase, we submitted the search string to the four bases and obtained 397 works, including duplicates. Of these, 33 works (8.33%) came from Science Direct, four (1.01%) from PubMed, 86 (21.72%) from Web of Science, and 273 (68.94%) from Scopus. To select relevant works, we filtered the resulting set of studies in a three-step process, represented in Figure 3, applying the selection criteria established in the research protocol (Table 1). Zotero5 was used to organize references and remove duplicates.

The first filter (F1) consisted of removing duplicates, which reduced the set of 397 works to 309 (77.83%) – Zotero automatically identified 83 works, and we manually removed another five, totaling 88 duplicate items (22.17% of the total). Then, three independent researchers performed the second filter (F2), applying the inclusion and exclusion criteria after

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4The tool is part of the Microsoft Academic Services project (MAS) that offers Artificial Intelligence solutions to support researchers in conducting their research. Available at: https://academic.microsoft.com/home.

5https://www.zotero.org/
reading the title, abstract, and keywords of the 309 remaining studies. This resulted in the exclusion of 264 (66.5%) works. In addition to the exclusion criteria listed in Table 1, we excluded (i) secondary or tertiary studies, (ii) works that were not written in English or Portuguese, (iii) works that had three pages or less, and (iv) works that were not published in peer-reviewed venues – here one should note that the work of Bartle (1996), despite being widely used in several studies, was excluded from this mapping because it did not meet this last requirement.

Aiming to verify the reliability of the filtering process, we randomly selected a sample of 40 works (10.1% of the total). We asked three other researchers to analyze them independently, applying the inclusion and exclusion criteria. We then calculated the level of agreement between the three evaluators and between these evaluators and the initial score. We used the Pearson’s correlation coefficient (PCC)\(^6\), and all tests showed a strong positive agreement between raters, with \(r\) ranging from 0.408 to 0.720 between raters (\(p \leq 0.05\)).

Once attested the reliability of the filtering process, we performed the third filter (F3) in 45 (11.33%) studies, which consisted of reading the full text of these articles and reapplying the selection criteria. In this step, two evaluators independently analyzed the works and later discussed and consolidated their evaluations. In cases where the evaluators did not reach a consensus (six works), a third evaluator analyzed them separately to validate the applied criteria. Thus, we excluded 29 (7.3%) studies in this filter, which resulted in the final set of 16 accepted articles, namely: Bontchev et al. (2018); Kahn et al. (2015); Shen et al. (2020); Fortes Tondello et al. (2018); Nacce et al. (2014); Si et al. (2017); Rodrigues and Brancher (2018); Chandra et al. (2019); Benlamine et al. (2017); Calegari and Celino (2018); Brühlmann et al. (2020); Yee (2006); Tondello et al. (2017); Vahlo et al. (2017); Tondello et al. (2019); Bicalho et al. (2019). Of these, five (31.25%) studies came from Science Direct, two (12.5%) from Web of Science, and nine (56.25%) from Scopus.

Seven additional studies were analyzed using the same filter.

\(^{6}\)https://www.statisticshowto.com/probability-and-statistics/correlation-coefficient-formula/#definition (Last access in October, 2022).

4 Results

In this section, we present the results obtained by analyzing the data extracted from the accepted studies as answers to the research questions (RQ) listed in Section 3.

4.1 Classifications of player profiles (RQ1)

The accepted works propose or update classifications of players’ profiles in games or gamified systems, using their motivations, behaviors, personality characteristics, or preferences as a parameter. Fifteen (78.9%) of the 19 works propose new classifications, and four (21.1%) update or modify an existing classification in the literature. Eighteen (94.74%) classifications focus on games and one (5.26%) on gamified systems, more precisely, on applications for gamified travels (Shen et al., 2020).

Regarding the entities or objects of classification explored in the works, we observed that most classifications deal with behavior (7 works – 36.84%), and the least explored entity is personality characteristics, with two (10.53%) works only (Bateman et al., 2011; Nacce et al., 2014) – as shown in Figure 4. Considering the difference between typology and taxonomy (as discussed in Section 2), it is worth noting that all 19 studies accepted present taxonomies once they all used empirical methods to gather data to ground the proposed profiles. Table 2 presents a summary of the identified classifications.
In general, the analysis of the 19 articles revealed the existence of three types of player classification: (1) specific to a game, (2) specific to a game genre or mechanics, and (3) generic.

In the first case, **game-specific**, the classification refers exclusively to the context of a specific game, not corresponding to a broader generalization beyond it, due to the absence of evidence to prove this. An example of this type is the work of Rodrigues and Brancher (2018), in which both the classification and the used data relate only to the game “Space Math”.

In the second, **specific to a genre or mechanics**, the definition of each player profile can be extended to an entire genre or game mechanic. A good example of this type of work is (Chandra et al., 2019), which explicitly covers the exploratory process of virtual environments, classifying players based on their behavior towards this type of mechanics. Another work that exemplifies this type of classification is the one presented by Shen et al. (2020), which typifies the behavior of participants in gamified travel.

Finally, the **generic classifications** apply to human behavior patterns and human preferences regarding games and are not limited to a specific game or genre. An example is “The Trojan Player Typology” by Kahn et al. (2015), which is broadly based on a player’s preferences. Another example would be Tondello et al.’s taxonomy (Tondello et al., 2017), which, similarly to the previous one, considers the preferences of individuals in the classification.

### 4.2 Publication types (RQ2)

We observed that the year of publication of the obtained works varies from 2006 to 2020, with 2017 and 2018 being the years with the highest number of publications (four works, or 21.05%, in each), as shown in Figure 5. No works published from 2007, 2010, 2012, 2014, and 2016 were identified. We highlight that we did not include Bartle’s work in the results because it did not meet the selection criteria. Hence, the oldest work was Yee (2006), published in 2006, and which builds its proposal on the work of Bartle when exploring quantitative measures to analyze the original types – a study that provided the basis for only three of the four motivations originally pointed out (achievement, social and immersion), allowing to check the type killer proposed by Bartle.

Regarding the publication types, 10 (52.6%) classifications were published in proceedings, while nine (47.4%) were published in journals, as indicated in Table 2. The journals Computers in Human Behavior and Entertainment Computing stood out for having published two classifications each. The Brazilian Symposium on Games and Digital Entertainment (SBGames) also had two publications. Figure 6 relates the types of venues with the years of publication.

### 4.3 How classifications are proposed (RQ3)

The SM we conducted aims to bring light to the application of existing classifications for the design and study of digital games and to outline a characterization of the research that gave rise to the classifications analyzed. In that regard, all the papers reported employing applied research. Most of them relied on quantitative approaches – 12 (63.16%). One (5.26%) study focused on qualitative research, and six (31.58%) others followed mixed approaches, combining quantitative and qualitative measures to deepen and enrich their results.

All studies report descriptive research. However, some of them also describe exploratory activities, such as (Tondello et al., 2017) and (Tondello et al., 2017). The most used method was surveying, applied in nine (47.37%) studies. In most cases, the surveys generated data to identify and extract player profiles through advanced statistical analysis techniques or machine learning. Another common approach was game metrics, such as hours played, number of wins and losses, and areas of the map most explored. Six (31.58%) studies analyzed this data type to extract their proposed classifications. Some works relied heavily on bibliographic research, building and complementing their classifications from related theories, as did Fortes Tondello et al. (2018), whose research also stands out for having an explanatory bias. Some studies have combined the three types of research in complementary phases or steps.
### Table 2. Summary of the 19 identified classifications

| REF | PUBLICATION | TYPE | YEAR | GENRE | ORGANIZATION | CLASSIFICATION | Qty | CATEGORIES | Descriptors |
|-----|-------------|------|------|-------|--------------|----------------|-----|------------|-------------|
| Yee (2006) | Cyberpsychology & Behavior Journal | 2006 | RPG | ✓ | ✓ | ✓ | ✓ | PROPOSALS | Achievement, Social, Immersion |
| Schuurman et al. (2008) | ACM DIMEA Proceedings | 2008 | General | ✓ ✓ | ✓ | ✓ | 4 | Fanboys, Competitors, Escapists, Time-Killers |
| Drachen et al. (2009) | IEEE CIG Proceedings | 2009 | Puzzle and strategy | ✓ ✓ | ✓ | ✓ | 4 | Veterans, Sowers, Pacifists, Runners |
| Baeteman et al. (2011) | DiGRA Proceedings | 2011 | General | ✓ ✓ ✓ | ✓ | ✓ | 4 | Tactical, Logical, Strategic, Diplomatic |
| Nacke et al. (2014) | Entertainment Computing Journal | 2014 | General | ✓ ✓ ✓ ✓ | ✓ | ✓ | 7 | Seeker, Survivor, Daredevil, Mastermind, Conqueror, Socializer, Achiever |
| Kahn et al. (2015) | Computers in Human Behavior Journal | 2015 | MOBA/MMO | ✓ ✓ ✓ ✓ | ✓ | ✓ | 6 | Socializer, Story-driven, Escapist, Completionist, Smarty-pants, Competitor |
| Benjamin et al. (2017) | Springer LNCS Proceedings | 2017 | Action | ✓ ✓ ✓ ✓ | ✓ | ✓ | 4 | Mastery-Approach, Avoidance, Performance, Avoidance |
| Si et al. (2017) | Entertainment Computing Journal | 2017 | RTS | ✓ ✓ | ✓ | ✓ | 4 | Wanderers, Seers, Followers, Targeters |
| Tondello et al. (2017) | ACM CHI Play Proceedings | 2017 | General | ✓ ✓ ✓ | ✓ | ✓ | 14 | Elements: Strategic resource management, Puzzle, Artistic movement, Sports and Cards, Role-playing, Virtual goods, Simulation, Action, Progression (Game Playing Styles: Multiplayer, Abstract interaction, Solo play, Competitive community, Casual play) |
| Vahlo et al. (2017) | JCMC Journal | 2017 | General | ✓ ✓ ✓ | ✓ | ✓ | 7 | The Mercenary, The Adventurer, The Commander, The Daredevil, The Companion, The Partner, The Explorer |
| Calegari and Celino (2018) | Springer LNCS Proceedings | 2018 | GWAP | ✓ ✓ | ✓ | ✓ | 4 | Beginners, Snipers, Champions, Trolls |
| Rodrigues and Brancher (2018) | SBGAMES Proceedings | 2018 | Serious | ✓ ✓ | ✓ | ✓ | 4 | Advanced, Skilled, Beginner, Intermediate |
| Chandra et al. (2019) | IEEE/ACM ASONAM Proceedings | 2019 | RPG | ✓ ✓ | ✓ | ✓ | 4 | Lone Wolf, Small Pack Wolf, Large Pack Wolf, Social Butterfly |
| Shen et al. (2020) | Tourism Management Journal | 2020 | N/A | ✓ ✓ | ✓ | ✓ | 6 | Knowledge reflection, Reward seekers, Explorers, Curiosity seekers, Sensation seekers, Flow experiences |
| Bühmann et al. (2020) | Frontiers in Psychology Journal | 2020 | MOBA | ✓ ✓ ✓ | ✓ | ✓ | 4 | Amotivated, External, Intrinsic, Autonomous |

**UPDATES**

- Bontchev et al. (2018) | Computers in Human Behavior Journal | 2018 | General | ✓ ✓ | ✓ | ✓ | 4 | Competitor, Dreamer, Logician, Strategist |
- Fortes Tondello et al. (2018) | IJHCI Journal | 2018 | General | ✓ ✓ ✓ | ✓ | ✓ | 3 | Action Oriented, Esthetic Oriented, Goal Oriented |
- Bicalho et al. (2019) | SBGAMES Proceedings | 2019 | Shooter | ✓ ✓ ✓ | ✓ | ✓ | 8 | Casual Killer, Casual Achiever, Casual Socializer, Casual Explorer, Hardcore Killer, Hardcore Achiever, Hardcore Socializer, Hardcore Explorer |
- Tondello et al. (2019) | IFIP INTERACT Proceedings | 2019 | General | ✓ ✓ ✓ ✓ | ✓ | ✓ | 5 | Aesthetic orientation, Narrative orientation, Goal orientation, Social orientation, Challenge orientation |

Under ORGANIZATION, read D = Demographic, G = Geographic, P = Psychographic, and B = Behavioral.
4.4 Strategies to obtain classifications (RQ4)

We also searched for information on methods used by researchers to identify the players’ profiles and propose their classifications. We observed that all studies rely on empirical research, showing that all analyzed studies aimed to propose taxonomies. Most studies (15 - 78,94%) used surveys with players as the primary way to gather data to identify patterns and group players in profiles according to each study’s focus. Four (21,05%) works used other methodologies involving clustering of game metrics. Besides the studies that used surveys, the work of Shen et al. stands out for using a specific methodology, called Q Methodology, to identify their players’ profiles (Shen et al., 2020).

According to the authors, the Q methodology is a qualitative research approach developed in 1935 that combines qualitative explanation with quantitative statistical analysis and overcomes some drawbacks of exploratory factor analysis. In the words of Shen and coauthors, the Q methodology reveals groups of individuals who have ranked statements in the same order and categorizes them under each factor. Hence, it changes the focus from variables to respondents to explore subjectivity (Shen et al., 2020). Brühlmann et al. (2020) and Si et al. (2017) combined surveys and game metrics – Si et al. (2017) also conducted interviews with players. The work of Benlamine et al. (2017) was the only study that also analyzed eye-tracking and physiological data. This work stands out because the authors collected multimodal data from the player’s body and face (visual and physiological signals) to analyze their affective and mental states and produce a machine learning model to predict players’ motivational goal orientations.

Once all works report empirical research, user participation is a constant in their methodologies. As mentioned above, all studies report using data from players but with different origins. Some studies collect in-game data from players (sometimes in retrospect, as in (Drachen et al., 2009))’s work, that studied patterns of playing behavior in the commercial game Tomb Raider: Underworld, others conduct surveys or interviews.

Regarding the sample size in the analyzed works, we observed the number of participants varying from 21 (Benlamine et al., 2017) to over 50,000 players (Fortes Tondello et al., 2018; Nacke et al., 2014). For the sake of organization, we grouped the studies in zones according to the sample size, being:

- **Strict user participation (n < 50):** three studies fit this category (Bicalho et al., 2019; Benlamine et al., 2017; Si et al., 2017). These studies offer an initial understanding or more general models of players’ behaviors or motivations, but the limited user participation compromises these proposals’ generalization.

- **Wide user participation (50 ≥ n ≤ 1000):** Seven studies (Bontchev et al., 2018; Shen et al., 2020; Rodrigues and Brancher, 2018; Brühlmann et al., 2020; Calegari and Celino, 2018; Tondello et al., 2017, 2019) fit this range of participants. Interestingly, only two studies had national samples (i.e., they did not compose their sample with people of different nationalities). This sample heterogeneity contributes positively to generating more comprehensive models and classifications.

- **Massive user participation (1000 ≤ n):** Nine studies fit here (Kahn et al., 2015; Fortes Tondello et al., 2018; Nacke et al., 2014; Chandra et al., 2019; Yee, 2006; Vahlo et al., 2017; Bateman et al., 2011; Schuurman et al., 2008; Drachen et al., 2009). The two works (Fortes Tondello et al., 2018; Nacke et al., 2014) that presented the most extensive sample (50,423 participants) performed tests on a base test of the game EverQuest II – both shared the same database. Five of these studies in this range recruited participants, and the four performed their tests based on existing databases.

4.5 Organization of the classifications (RQ5)

To better understand the proposed classifications, we noted which criteria were used to classify players into types and organize them. For this, we used the work of Hamari and Tuunanen (2014), which lists four organization criteria: geographic (i.e., divides players into groups based on where they live); demographic (i.e., the organization is based on descriptive characteristics such as age, gender, education or social status); psychographic (i.e., grouping players based on their attitudes, interests, values and lifestyles) and behavioral (i.e., grouping based on patterns of behavior with or in relation to the game). Sometimes, the organization may involve more than one criterion, combining them to generate more “detailed” types.

Thus, it is more appropriate to indicate what seems to be the main criterion used without discarding the others. The criteria behavioral (12 papers - 63.16%) and psychographic (7 papers - 36.84%) were the main criteria used. As shown in Table 2, many studies also considered demographic factors to investigate whether descriptive characteristics such as gender, age, or even education significantly affect the types identified, as done by Rodrigues and Brancher (2018).

The categories used in the analyzed classifications are listed in Table 2. The number of categories proposed in each work – an indication of the granularity of each classification – varies from three to 14 categories, as shown in Figure 7. The works with the fewest categories are Yee (2006) and Fortes Tondello et al. (2018), with three categories each. The most frequent number of categories among the analyzed group was four, observed in 10 works.

Furthermore, the work of Tondello et al. (2017) stood out for having the largest number of categories, 14. However, this “leap” is explained by the authors using a different perspective to compose their taxonomy, which is the combination of nine game elements preferred by players and four “play styles”. Only three classifications have sub-levels for the identified types: (Yee, 2006), (Calegari and Celino, 2018) and (Tondello et al., 2017). The Table 2, presented above, indicates the number of categories for each work and lists each one of them.

4.6 Domains of the classifications (RQ6)

Almost all the classifications analyzed focus on game studies (18 out of 19, i.e., 94.74%), and only the work by Shen...
et al. (2020) covered gamified systems. Following the same proportions, 18 (94.74%) focused on overall digital media. Again, the classification proposed by Shen et al. stands out for studying pervasive systems, i.e., that blend the boundaries between the real and virtual world, which allows us to consider them mixed media.

In the 18 works that focused on games, 12 (66.67%) classifications aim to cover the domain in general without pointing out distinctions between types or genres of games. Four (22.22%) works have a more restricted scope, as they were developed for specific games or types of games (Drachen et al., 2009; Brühlmann et al., 2020; Calegari and Celino, 2018; Rodrigues and Brancher, 2018). Drachen et al. (2009) and Brühlmann et al. (2020) focused on classifying players of specific games, the first on Tomb Raider: Underworld, and the second on League of Legends. Calegari and Celino (2018) focused on games with a purpose or GWAP (Games With A Purpose), which are games that encourage users to perform tasks with an entertainment reward. Rodrigues and Brancher (2018) focused on a classification for educational games.

Some works, however, make distinctions between “segments” of games, for example, multiplayer and online, as is the case with Yee (2006) and Chandra et al. (2019) who built their rankings by focusing on MMORPG games. Regarding the genres of the games targeted by the classifications, most works (eight – 44.44%) were not tied to a specific genre. In contrast, the others were equally divided among other genres, as shown in Figure 8.

The work of Kahn et al. (2015) stood out for targeting two genres, MMO7, and MOBA8. The definition of genres and types of games is a frequent cause of confusion and disagreement, and there is no standard followed in the industry, and the studies of games (Grace, 2005). Therefore, the division used here was based on the complementary views of Grace (2005) and Apperley (2006).

Regarding their purpose, most of the papers focused on games for entertainment, as shown in Figure 9. The work of Nacke et al. (2014) stands out for embracing games for all purposes, which seeks broad applicability of the typology.

7Massively Multiplayer Online Game – games capable of supporting large numbers of players simultaneously and connected
8Multiplayer Online Battle Arena – a type of game in which the player controls a character in a battle between two teams, to defeat the enemy base

4.7 Use of game elements in the classifications (RQ7)

We observed if and how the studies considered game design elements to compose their classifications to gain perspective on how they explore games’ particularities. We noted that only two (10.53%) of the 19 works do not directly incorporate game elements in their classifications (Benlamine et al., 2017; Bateman et al., 2011). That can be explained by the fact that Bateman et al.’s work offers a view centered more on players’ subjectiveness, focusing on players’ personality factors and play styles.

However, the work conclusions inspired a new player satisfaction model, the BrainHex (Nacke et al., 2014), based on game elements. Regarding the work of Benlamine et al. (2017), this study used a different approach to obtain data to compose their classification (monitoring players’ visual and physiological signals) and thus explored game elements indirectly, in the form of game scenes and how they affect players’ motivations.

Considering the other 17 studies, we noted that we could group the game design elements considered by the classifications into two types: conceptual and parametric. We considered conceptual elements as the qualitative aspects extracted from theories or mechanics that make up conceptual aspects of games – for example, game genres, mechanics (e.g., cards, strategic management, roleplaying or puzzles),
and motivations (e.g., surprise, socialization, progression, accumulation).

Fourteen (73.68%) works explored this type of elements: Bontchev et al. (2018); Kahn et al. (2015); Shen et al. (2020); Fortes Tondello et al. (2018); Nacke et al. (2014); Si et al. (2017); Rodrigues and Brancher (2018); Yee (2006); Tondello et al. (2017); Vahlo et al. (2017); Tondello et al. (2019); Bicalho et al. (2019); Bateman et al. (2011); Schuurman et al. (2008). The percentage of studies in this group suggests a slight preference for exploring this element type.

On the other hand, parametric elements would be the quantifiable elements used to detect players’ behavior patterns – we can point as an example of these quantifiable elements: game time, win rate, score, number of shots, and lives, among others. Nine studies (47.37%) considered this type of element to determine their profiles: Bontchev et al. (2018); Fortes Tondello et al. (2018); Nacke et al. (2014); Rodrigues and Brancher (2018); Chandra et al. (2019); Calegari and Celino (2018); Brühlmann et al. (2020); Bicalho et al. (2019); Drachen et al. (2009).

The works that used neural networks for clustering (Rodrigues and Brancher, 2018; Chandra et al., 2019; Calegari and Celino, 2018; Drachen et al., 2009) relied heavily on this type of element to perform their analysis and identify patterns. It is also worth noticing that Bontchev et al. (2018); Fortes Tondello et al. (2018); Rodrigues and Brancher (2018); Nacke et al. (2014); Bicalho et al. (2019) stood out for considering both types of elements in their research.

### 4.8 Tools proposed to identify players profiles (RQ8)

Aiming to offer some additional information that could help other researchers and practitioners use the classifications identified here, we noted which studies proposed tools to help other researchers apply their classifications to identify which profile fits a specific player or group of players. Eight (42.10%) papers present, besides a classification, an instrument to this end (Bontchev et al., 2018; Shen et al., 2020; Benlamine et al., 2017; Vahlo et al., 2017; Tondello et al., 2019; Bicalho et al., 2019; Bateman et al., 2011; Kahn et al., 2015).

In general, the proposed instruments were derived from studies that used surveys to gather data on players’ traits. It generated self-report tools (questionnaires or scales) that present a set of questions that help to relate players with profiles regarding behavior, preferences, and motivations. Table 3 indicates these studies, specifying the entity their instrument address, the types they identify, and the number of items/questions each one presents. It is worth noticing that not all of the instruments are validated, and, in some cases, they still need further studies to prove them.

One of the other works (Shen et al., 2020) that do not propose a specific instrument gives clear recommendations on using the methodology used in the study to obtain their classification (the Q methodology) to identify other players’ profiles. This methodology, briefly discussed above, is widely used in the social sciences and humanities to seek a more quantitative bias to investigate beliefs, attitudes, behaviors, and opinions (Herrington and Coogan, 2011). Applying this methodology to identify players’ profiles is a differential of this work and shows an alternative path to others who want to explore another perspective to this process.

Regarding the studies that relied on game metrics clustering with machine learning techniques, it was unclear if some proposed, in fact, a tool or algorithm for general use to identify profiles given other datasets. However, the description of their methodologies, processes, and lessons can undoubtedly support other studies that aim to do the same.

### 5 Discussion

The analysis of the results allowed us to draw an overview of the players’ classifications available in the literature and highlighted relevant points to be considered in the mission to make these results more beneficial for the design and evaluation of games. Therefore, in this section, some insights and concerns that emerged during the conduction of the research are discussed, aiming to provoke reflections and contribute to game studies.

#### 5.1 Lack of coherence in the use of terms

In games research, the same phenomenon previously described by Doty and Glick (1994) occurs: many works use the terms typology and taxonomy interchangeably, although they are not synonymous. We agree with Doty and Glick that such confusion of terminology can impact the work methodology.

However, we also observed that this misinterpretation makes understanding the classification and its application in
game design and evaluation challenging. In addition, the incoherent use of terms makes an objective comparison of the classifications difficult since it becomes hard to identify, and it is necessary to analyze the terms used in the context of each work.

In game studies, this issue goes beyond the scope of the discussion about the common confusion between typology and taxonomy. The works analyzed employ many terms with different meanings but are treated as having similar natures. For example, at least seven different terms were identified in the analyzed works: typology (Kahn et al., 2015; Shen et al., 2020; Nacke et al., 2014; Bateman et al., 2011; Schurman et al., 2008); taxonomy (Tondello et al., 2017; Vahlo et al., 2017; Bicalho et al., 2019); model (Fortes Tondello et al., 2018; Benlamine et al., 2017; Yee, 2006; Drachen et al., 2009); profiles (Rodrigues and Brancher, 2018; Calegari and Celino, 2018; Brühlmann et al., 2020); types (Chandra et al., 2019; Drachen et al., 2009); styles (Bontchev et al., 2018); and archetypes (Si et al., 2017). In some cases, more than one term is used to describe the same classification.

This issue echoes the analysis of Kulima who affirms that the lack of conversation between game studies and general design research is visible yet historically explainable (Kulima, 2015). We also agree with the author when she states that, considering the field’s maturity, incorporating more sound design research frameworks could alleviate this epistemological gap, which we find to be not only between the practice and academia but also inside game theoretical research.

The lack of standardization in using these terms makes it difficult to correctly identify the proposed classifications and the possibility of applying the terminologies for subsequent studies. This issue may come from the growing effort to solidify the theoretical framework on games, which is also manifested in the debate and adequacy of using different terms in this area. For example, Darin and Carneiro (2020) and Borges et al. (2020) discuss the lack of consensus on what the term “player experience” means, what dimensions it encompasses, and which human characteristics and market practices it impacts.

We highlight that the use of technical and scientific terms must be done carefully, as it can generate confusion and inconsistencies in research, design, and game evaluation. The misuse of terms makes it difficult to systematize and develop mature research on human factors in games and diffuse poorly founded knowledge. Thus, it is necessary to discuss and identify ambiguities about terms and concepts related to player behavior and game elements, aiming to solidify them, contributing to the maturation of practices and research in games and interfaces.

5.2 Relationship between different player classifications

When surveying the different classifications of players, one could think that seeking a correlation between the elements of the classifications towards a unified model would be desirable. However, in this work, we did not look for those relationships. As we see it, one needs to recognize that classifications are an abstraction of the complexity of human behavior, emphasizing some characteristics, to the detriment of others, to group individuals into types.

A unified model would look for similarities between abstractions. Therefore, a new abstraction must be created, looking for characteristics between different classifications. That “abstraction of previous abstractions” increasingly diminishes the ability to represent the complexity of human behavior, which is likely to move further and further away from the real motivations of individuals.

We demonstrate our point by analyzing the attempt at unification by Stewart (2011), in which the author proposes a unified model for personality and play styles. The work begins by approximating the four types of players proposed by Bartle (1996) with the four types of temperaments by Keirsey (1998). Based on each author’s descriptions of types, Stewart (2011) proposes that Keirsey types are supersets of Bartle types and correlate the models. After defining the four types of players from the union of the theories of those two researchers, the author uses different known classifications, relating their types to the now unified elements.

In the approximation created between the Killer type (Bartle) and the Artisan type (Keirsey), the author emphasizes the common characteristic between the types as manipulation (the author prefers to call the Killer type Manipulator). When describing the Killer, the author points out the player’s main characteristics: the desire to impose themselves on other players and demonstrate their superiority over others. As for Artisan, the author emphasizes the player’s desire to have power over everything in their world.

Stewart then presents some expressions from the original works related to their types to determine that correlation. If we tabulate and observe the terms the author uses to correlate the two classifications (Table 4), one can realize that some elements can be directly related. Still, many others do not have correspondence or would need a greater abstraction to be associated, removing a type’s characteristic so it can relate to the other one.

Table 4. Summary of analysis of correlation between characteristics of the Artisan (Keirsey, 1998) and the Killer (Bartle, 1996) types

| Artisan (Keirsey, 1998) | Killer (Bartle, 1996) |
|------------------------|-----------------------|
| tactical               | -                     |
| fun-loving             | juicy fun             |
| realistic              | -                     |
| unconventional         | -                     |
| spontaneous            | -                     |
| seek stimulation       | adrenalin-shooting    |
| prize freedom          | -                     |
| -                      | imposition upon others|
| -                      | cause distress        |
| -                      | thrill of the chase   |
| -                      | reputation            |

Thus, a unified model becomes a new abstraction. The sense that it more comprehensively represents players’ motivations turns out to be just a new way of classifying them – perhaps even less representative because it is an abstraction of several abstractions. However, executing a unification is not unproductive since it makes us reflect on the characteris-
tics of the types of each classification.

Still, we believe that it is more productive for designers, game creators, and researchers to have a broader knowledge of the possibilities of organizing players’ motivations. Then they can select the one that best helps in developing a specific project, considering the criteria used for the classification organization. For that, we believe that this mapping can contribute to this choice.

5.3 Players profiles and game elements

The players’ profiles and motivations can impact how a group engages with a game. Hence, the analysis of player motivations can inform game designers and researchers on the behavioral patterns of game players, and they may use those behavioral patterns to drive eventual player engagement through game elements. For example, achiever players engage with tangible rewards for achievement, like coins and badges, while explorer players engage by exploring the rules and bounds of the game environment (Stefan et al., 2017).

However, our analysis showed that classifications that seek to explain the behavior and motivations of different player profiles – in most cases – do not directly relate the identified types to specific game elements. In the context of games, the term “element” can represent different ways of dividing or understanding the parts of a game. Such elements have been identified in the game design literature at different levels of abstraction. Schell, for example, defines four elements: mechanics, narrative, aesthetics, and technology (Schell, 2020).

Another famous approach is the framework MDA, which proposes the division into mechanics, dynamics, and aesthetics (Hunicke et al., 2004). The possibilities are endless since the elements that make up the games can still be grouped in terms of components, environment, players, context, rules, mechanics, theme, interface, and information (Järvinen, 2009). Or – as Bjork and Holopainen present – can be defined by design patterns exceeding 100 (Bjork and Holopainen, 2004).

Although this diversity in understanding the elements that make up a game derives from seeing which characteristics are essential to be observed, depending on the purpose, it is not easily comparable – and the same happens to players’ classifications. One can perceive the different perspectives on game elements in how they are delimited by different definitions, in different levels of granularity, views, and forms, making it difficult to compare which game elements from one work relate to the elements from another. The same happens to how players’ profiles can relate to the different categories of game elements, ultimately confusing their application in practice.

However, the work of Tondello et al. (2019) stands out in discussing that analyzing player types in a way that is directly related to game elements makes the application of types more direct and practicable. The authors translate the game elements into activities that players engage in while gaming, such as progression, action and role-playing, resource management, exploration, or combat.

In the present work, we confirmed this perspective by identifying that most approaches to studying player types seem to ignore the relationship between such types and game elements. We agree with the authors that much work focuses on higher-level factors such as immersion or achievement, making applying such classifications difficult. Although we identified some preliminary initiatives to relate the behavioral profiles of players with the components of games (Paulin, 2013), it is necessary to deepen the study of these elements and their correlation with the motivational and behavioral profiles of players.

5.4 Gaps and research opportunities

As detailed above, the results of this SM indicate a research gap for carrying out experimental studies that map game elements to player profiles. Our findings also indicated the need to investigate personality characteristics further – an essential factor for engagement but still little explored. Furthermore, some expanding domains, such as serious games and gamified systems, were timidly addressed in the classifications (only in one work each).

As recent research indicates, the effectiveness of serious games appears to be correlated to the degree to which players like the game (Van Gaalen et al., 2022). Hence, using a player classification in the games user research can help game designers to identify more clearly interpretable patterns and show how players perceive play to design more compelling games.

It is also necessary to highlight the scarcity of Brazilian research on the subject – in formal and informal searches, only two works (Rodrigues and Brancher, 2018; Bicalho et al., 2019) were identified in a national event. There is an opportunity of developing more research that seeks to investigate the profiles of Brazilian players and users, aiming to understand cultural particularities.

In this sense, we agree with the conclusions drawn in the work of Miranda et al. (2021) when they question the use of game research tools made from and for other cultural and social characteristics, which are only assumed to be valid for local users. We underline the work of Kahn et al. (2015) which stood out for validating its typology in two different cultural contexts (with American players and, in other ways, with the Chinese audience), which is an excellent example to be followed in future research.

Finally, it is necessary to emphasize that there is still a wide range of games to be examined. Works that explore online games and their direct variations (such as MMO, MMORPG, and MOBA, among others) are common, while few works deal with offline or single-player games, for example. As pointed out in the work of Fortes Tondello et al. (2018), we also identified that research on player classifications has tended to fall into the same group. Observing our findings, we have the same understanding as Hamari and Tuunanen (2014) when their work suggests that it can compromise the generalizability of the results.

6 Research Limitations

Apart from the contributions to the literature in this domain, this study is not free from limitations characteristic of most
systematic reviews and mappings. First, due to the nature of the process of selecting, filtering, and extracting data from articles, it is possible that relevant studies have not been analyzed. In addition, only four bases were selected. Although evaluating the bases’ quality was decisive in the choice of these four as representative of the research scenario in national and international games, the authors understand that there may be works that are relevant to the objectives of this research that are not indexed in them.

Furthermore, another limitation can be found in the fact that the searches did not capture some relevant works due to the wide variety of terms papers use for classifications (which are not always synonymous, as discussed in Section 5). Such lack of standardization makes it difficult to build a complete and far-reaching search strings. To mitigate such limitations, relevant works identified in another SM were manually included and properly filtered and analyzed, as described in Section 3.

7 Conclusion

Although the literature is rich in works that typify and classify players, the lack of an objective analysis can make it difficult for researchers and practitioners to decide how to employ them to support game user research and game design. Thus, this research investigates players’ taxonomies and typologies regarding their motivations, behavior, and personality characteristics, analyzing how they explore these traits.

Our results indicated various categories to describe players, different ways to propose and validate such categorizations, and tools to assist researchers and practitioners in identifying players’ profiles. They can be used to help customize the player’s experience and increase the engagement and motivation of specific groups with the interactive and narrative elements most suitable to them. They can also be employed in experimental studies that analyze physical, psychological, and social factors impact on player profiles.

Our future work focuses on analyzing the relationship between different interface and interaction elements in games with the level of motivation and engagement of different player profiles. Attempts were made to relate players’ behavioral profiles with game components, but still, superficially (Paulin, 2013). Research on game resources is pretty fragmented, and experimental studies are needed to map game resources to player engagement (Boyle et al., 2016), relating them to their motivational and behavioral profiles. Thus, in the future, this research will address the search for a relationship between player profiles and their level of engagement with the game, given specific elements of digital games.

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