From Points to Progression: A Scoping Review of Game Elements in Gamification Research with a Content Analysis of 280 Research Papers

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We lack a shared and detailed understanding in gamification of what game elements are. To address this, we provide a scoping review of the last five years of gamification research, focusing primarily on how game elements have been applied and characterized. We retrieved the definitions of game elements from 280 research papers, conducted a content analysis, and identified their features. On the basis of this information, we provide responses regarding the frequently cited game elements, whether they are consistently characterized in the literature, and the frequently stated features of these elements. Our research has identified 15 game elements in the literature, with points, badges, and leaderboards being the most prevalent. As a first step toward clear definitions, we suggest a set of properties to characterize these game elements. The results of our review contribute to the formation of a consensus among gamification scholars about the application and definition of game elements.

CCS Concepts: • **Human-centered computing → HCI theory, concepts and models**.

Additional Key Words and Phrases: game element,gamification,definition

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1 INTRODUCTION

The most popular definition of gamification in science [45] was introduced in 2011 by Deterding et al. [5]. They defined gamification as "the use of game design elements in non-game contexts". An essential part of this definition are *game elements*. Thus, for gamification researchers and practitioners alike, a common understanding of what constitutes game elements is fundamental. However, as criticized by Werbach [45], there is no clear definition of game elements, nor a universal list of them. Deterding et al. [5] described them as "elements that are characteristic to games—elements that are found in most (but not necessarily all) games" and Tondello [41] more recently referred to them as building blocks that are characteristic to games and, respectively, gamified systems. Although these descriptions characterize the general idea of game elements, they still provide much room for interpretation.

In fact, it appears that the obscurity of what game elements are increases when attempting to discern between their many representations. As noted by Seaborn and Fels [33], "game elements often interrelate and can bear similar, if not the same, names." This is unquestionably an issue for gamification research in the sense of being able to compare, replicate, and generalize research results. In the gamification literature, the notion of game elements has become ubiquitous, with *Badges*, *Points* and *Leaderboards* being the most frequently used ones [8, 33]. But also other game elements have been used frequently in gamification literature, such as *Achievements*, *Experience Points* and *Competition* [15, 33]—or are those actually the same elements? Are Achievements different from Badges? Are Experience Points just a subset of Points? Do users compete on a Leaderboard?

This fuzziness is concerning, especially when looking at research on tailored or adaptive gamification. Here, the recommendations for which game elements are most suitable for different types of users are re-applied in different situations and contexts [24, 42]. An example of such a recommendation is to use Points for a certain archetype of users. However, we can find contradictory definitions or descriptions of the Points game elements. For example, Smiderle et al. [36] used points in their gamified learning app: "*When students are completing a programming task, they can see how many points they could earn if they solve it successfully. When the solution is incorrect, the score is decreased by five points for each submission [...]. Students were warned that the scores obtained in the exercises would not affect their final grade on the course.*". Hoffmann et al. [9] also used Points in their gamified stress management app, which they defined as: *"Another reward system is the points the user receives for every task and diary entry. [...] points can be exchanged for items for the user's avatar in a shop."*. We have two different points systems defined in two papers, one uses them as a numerical reward that can be achieved or lost depending on learner performance, and the other uses them akin to a virtual currency, where points gained can be exchanged for an in game item within a game economy.

This example emphasizes the lack of a common understanding of specific game elements in gamification research. In this paper, we aim to contribute to this issue of shaping a common understanding among gamification researchers. To achieve this, we review the game elements commonly used in past research, as well as whether and how they were defined. We present the results of a scoping review of the last five years of gamification research. We gathered all articles that discussed the topic of gamification (see more details in section 3) over the past five years. Papers discussing full-fledged games instead of using game elements in a non-game context, such as *serious games* (i.e. games with an educational intention [1]) or *games with a purpose* (i.e. games developed to motivate players solve human computation tasks [44]), were excluded. After screening the abstracts of 1754 initial papers, removing duplicates and filtering those that did not clearly specify and clearly define which game elements were discussed in the paper, we considered 280 papers for our analysis. From this set of 280 papers, we extracted all the definitions of game elements

and performed a content analysis on the definitions, extracting properties from said description. Finally, we propose a common set of properties for the most referenced game elements, as well as pointing out the more infrequent properties referenced. Through this review, we aim to answer the following questions:

(1) What are the commonly cited game elements in the last five years of gamification research?
(2) Are these game elements consistently defined in the literature?
(3) What are the commonly referenced properties of these game elements?

First, regarding **RQ1**, our scoping review revealed a total of 15 commonly used game elements in the literature. According to previous literature reviews by Hamari et al. [8] from 2014 and Seaborn and Fels [33] from 2015, points, badges, and leaderboards are by far the most commonly used game elements in the recent gamification literature. Although this could be viewed as a replication and further support of previous findings, it also contributes to ongoing criticism that gamification relies too heavily on scoring systems—often the least exciting part of a game [29]. This ultimately leads to a lack of meaningfulness when these game elements are added to an activity [29, 43]. Second, regarding **RQ2**, we found that a large majority of research articles do not properly define or name the game elements they discuss and that game elements are not always consistently defined throughout the literature. This means that for many game elements with the same name, there are in fact multiple different interpretations. Upon further examination of the differences between game element definitions, we discovered that six out of 15 game elements had a strong and consistent identity. This indicates that the underlying properties of the provided definitions overlapped to a greater extent. The remaining game elements were either less consistently defined or had no strongly defined identity. Lastly, regarding **RQ3**, our results show that the underlying convergence of properties used to describe game elements by gamification researchers in the literature differs between elements. While some game elements, such as achievements or points, have a clearly defined set of properties according to existing literature (i.e., two or more properties present in at least 50% of the definitions), a majority of elements lack such cohesion, and some even have vastly different definitions.

Finally, we discuss the implications of our findings and derive descriptions of popular game elements. These descriptions are determined from reflexive tagging of the properties of the underlying game elements. We consider this a first step towards distinctly defining game elements. Using these descriptions, we improve on the loose general definition of game elements. Our findings pave the way for differentiating specific game elements, defining them, and gaining a more specific understanding of what constitutes game elements in gamification.

2 RELATED WORK

In this section, we present relevant research in the domain of systematic literature reviews as well as works establishing taxonomies or descriptions of game elements in gamification research to position our contribution in the research landscape.

2.1 Systematic Literature Reviews in Gamification Research

The literature on gamification has become massive because of the rapid growth of gamification as a research field [28]. Therefore, systematic literature reviews have become increasingly important for synthesizing findings and generating meta-level implications. This section will focus on literature reviews related to gamification. We will begin with early literature reviews that primarily address the question of whether gamification works. Then, we will move on to more recent literature reviews that focus more on the question of why and how it works. Lastly, we will present works

synthesizing gamification research in specific domains, such as education, health, crowdsourcing, and industry.

2.1.1 Does Gamification Work? The first wave of gamification research mainly focused on evaluating whether gamification works [28]. Therefore, it is not surprising that literature reviews at that time focused more on the effectiveness of gamification, rather than on understanding the circumstances under which gamification fails or succeeds. In 2014, Hamari et al. [8] published a literature review that focuses on the question of whether gamification works by analyzing the results of articles published between 2010 and 2013. They also analyzed which game elements were used by grouping them into 10 different categories, based on the terminology used in the reviewed articles. They found that, in general, gamification had positive behavioural and psychological outcomes. However, they note that the effects are highly dependent on contextual and personal factors. Regarding game elements, they found that the PBL triad (i.e., points, badges, and leaderboards) was by far the most commonly used combination. However, in contrast to our work, variations in the definitions of game elements were not the main focus of the work. In 2015, Seaborn and Fels [33] followed with a similar literature review focused on the results and approaches in gamification research. In line with Hamari et al. [8], they found that gamification can be considered successful in most cases [33]. They also analyzed the game elements that were used in the reviewed papers. In contrast to Hamari et al. [8], the authors provided definitions of the game elements and a list of alternative names to avoid confusion. However, these definitions and alternative names were not based on an analysis of how game elements were used in the reviewed articles. The paper does not clarify how these were derived. Presumably, the authors created the definitions based on their knowledge and experience to avoid confusion of readers. A more recent systematic literature review focused on the effectiveness of gamification was published in 2019 by Koivisto and Hamari [17]. Four years later, the authors again found that the overall results of gamification were positive, but note that "the amount of mixed results is remarkable". They found that education, health, and crowdsourcing were the most targeted domains in which gamification was used. Regarding game elements, they again found that points, badges, and leaderboards persist as the most commonly used ones. The authors identified game elements based on how they were referred to in the paper—because the main focus of the paper was not on the elements—without analyzing similarities or differences between them across different studies.

2.1.2 How and Why Does Gamification Work? In the further course of gamification research, the focus shifted towards explaining how and why gamification is effective [28]. Accounting for interpersonal differences in the perception of game elements emerged as a major focus of these works [15, 28]. Recent literature reviews also reflect these developments.Klock et al. [15] conducted a systematic review of factors considered for tailored gamification. They found that most studies relied on personal factors to derive which game elements are suitable for specific users. Regarding personal factors, they found that player typologies were used most, followed by gender and personality traits. They also analyzed which game elements were used in the reviewed articles. The reviewed articles grouped game elements based on their descriptions and images, resulting in a set of 36 game elements. Interestingly, in contrast to the works mentioned above, the PBL triad was not the most widely used combination of game elements. Instead, customization, badges, challenges, levels, competition, and leaderboards emerged as the most frequently used ones in the context of tailored gamification. However, the review examined tailored gamification, which only included articles that focused on adjusting game elements to certain user characteristics. On the contrary, this paper focuses more broadly on gamification research without restrictions on the context or focus of the articles. In addition, Böckle et al. [2] conducted a review of the gamification literature to identify the main objectives, elements, and challenges of current research on the development

of adaptive gamification approaches. The 43 studies included in the review aimed to alter the behaviour and goals of the user, support participation and learning, or create meaning by adapting feedback and points based on usage data and user profile. However, this work did not focus on which game elements were used or whether they were consistently defined in the reviewed articles. In contrast to the previous two systematic reviews, Krath et al. [19] focused on which theories were used in the broader areas of gamification, serious games, and game-based learning. Through a systematic literature review, they identified 118 different theories and determined commonalities in their core assumptions. The authors derived basic principles that help explain how gamification works based on the interrelations between these theories. Examples of these principles include illustrating goals and their relevance, and providing immediate feedback. Furthermore, the authors grouped the existing theories into three main clusters which they labelled "motivation and affect", "behaviour", and " learning". While an analysis of game elements was not included in their review, the identified theories can still be helpful in discussing the underlying mechanics of how game elements work.

2.1.3 Gamification in Specific Domains. Systematic literature reviews have been conducted in gamification research, focusing on specific domains. One such domain is health, where gamification has been widely applied [33]. For example, Koivisto and Hamari [16] reviewed gamification studies in the domain of physical activity. They found that gamification of physical activity has generally had positive results, but the results are less favourable when using more rigorous study designs. Most of the reviewed articles have focused on measuring physical activity, but often relied on self-reported data rather than objective measurements. Regarding game elements, they found that most works used points, scores, and goals. Definitions of game elements were not provided. Johnson et al. [13] analyzed the quantity and quality of evidence supporting the benefits and effectiveness of using gamification to improve health and well-being. The authors found that 59% of the participants reported positive effects of gamification, while 41% reported mixed effects. In line with reviews mentioned above, the authors also reported the game elements used in the studies. However, they also adopted the reviewed papers' information about which game elements were used, rather than analyzing and synthesizing this information across papers. Systematic reviews have also been conducted in the domain of education. Here, Hallifax et al. [7] focused on the use of adaptive gamification. They summarize the current trends and developments in the field, with a special focus on the types of research being conducted, the factors being used for adaptation, and the impact of adaptive gamification and its measurement. The authors found that most of the articles used an adaptation engine to adapt game elements to users and conducted a user study, followed by articles providing recommendations on which game element to use for which users and adaptation engines without further evaluation. They also found that adapting game elements typically involves using static adaptation (e.g., based on a learner's profile, such as their preferences and motivations) or dynamic adaptation (e.g., based on how a learner is performing or interacting with the system). In addition, it appears that shorter studies tend to find positive results from using adaptive gamification, while longer studies have more mixed results. Single game elements were not discussed in the review. Manzano-León et al. [22] also focused on education in their systematic review. Their findings support the idea that using gamification in education can positively impact students' academic performance, commitment, and motivation. The authors analyzed the occurrence of game elements by relying on authors' descriptions, without further synthesis or evaluation of similarities and differences across papers. In line with previous reviews, the most common gamification elements were points, medals, and rankings, which align with the PBL triad. In the domain of crowdsourcing, Morschheuser et al. [26] looked at how gamification has been studied by conducting a systematic literature review. The findings suggest that gamification

has successfully boosted participation and improved the quality of crowdsourced work. Studies of more homogeneous crowdsourcing tasks typically employ simpler gamification elements, such as points and leaderboards. On the other hand, crowdsourcing efforts that seek more diverse and creative contributions use more complex gamification elements. The game elements were clustered into categories, but no definition of these elements or categories was provided. Points and leaderboards were the most commonly used game elements.

2.2 Game Elements in Research and Practice

To ensure purposeful gamification, it is recommended to use an established process. These processes are often referred to as a *gamification framework* [18]. The aim of gamification frameworks is to help researchers and practitioners implement gamification by providing best practices, guidelines, and other tools based on previous research results. They often include, but are not limited to, a list of game elements that are recommended for a specific use case. For example, Marache-Francisco and Brangier [23] offer a list of 44 game elements on cards, sorted in 8 categories and describe each element in an additional table. Also, Chou's framework sorted 8 categories (different to Marache-Francisco and Brangier [23]) consisting of 78 game elements [3]. Thomas et al. [37] offer a list of 58 game elements, classified into 11 categories. They combine the game elements with their definition and the source of the definition in a table that is called *gamification codebook*. This is a useful tool for planning gamification in one's own project. These are only three of many examples of gamification frameworks that are for no specific application area and that may give similar or overlapping definitions of single game elements. If the same project had been done with each of these frameworks, the results may be different each time based on the different definitions of the game elements and the different categories. There are also many attempts to develop gamification frameworks for specific domains. For example, a systematic literature review on frameworks in learning environments identified 10 different frameworks or processes for the implementation of gamification in educational contexts [30]. However, these frameworks do not provide clear definitions for their recommended game elements (e.g., Lamprinou and Paraskeva [20], Silpasuwanchai et al. [34]). This lack of clarity contributes to the problem of no common understanding for certain game elements. However, although some gamification frameworks provide definitions of the recommended game elements, they do not necessarily agree. For example, Thomas et al. [38] defines a narrative as "an umbrella term which mostly includes a story, theme and a specific framing. A narrative is relevant for the user and the gamified application. It dives the whole application into one big waterproof narratology." whereas Tomé Klock et al. [40] claims that a narrative is "a consistent ongoing storyline. The use of stories allows the transmission of information and the guidance of the users, creating interactive experiences to engage users." The varying definitions found in different gamification frameworks may be the exact reason for the currently inconsistent understanding of game elements.

3 LITERATURE REVIEW PROCEDURE

This literature review was designed as a scoping review of the last five years of game element definitions given in gamification research, to address research questions **RQ1**–**RQ3**. We conducted a brief exploratory scoping review rather than an in-depth systematic review because the field of gamification and game elements is extremely large, with countless research papers discussing the topic. We outline the full process below.

3.1 Search Query and Research Databases

Subsequent to our goal to find rich definitions of game elements, we elaborated our research strategy. We used a general search query that was adapted to individual databases due to differences

Source	N° hits	Search query	Filters
ACM	351	[All: gamif*] AND [[All: "game elements"] OR [All: "game element"]] AND [Publication Date: Past 5 years]	Content type: research article - Publication Date: Past 5 Years
IEEE	103	gamif* AND ("game element" OR "game elements")	2017-2021
Science direct	397	(Gamification OR Gamified) AND ("game elements" OR "game element")	Content type: research article, select 2017,2018,2019,2020,2021
Springer Conference	636	(Gamif*) AND ("game elements" OR "game element")	Content type: conference paper, Language: English
Springer Article	267	(Gamif*) AND ("game elements" OR "game element")	
Total	1754		

Table 1. Search results specific strings, and applied filters for each source. We also include the direct URL to each search. Please note that we ran the searches on 21/01/2022, so current day results might differ.

in research databases and syntax. This means that we have different capabilities for using Boolean operators and wildcards, while still trying to maintain the intended meaning of the general string:

(Gamif) AND ("game elements" OR "game element")*

Table 1 shows the specific queries used for each database, as well as the specific filters and options used, the number of retrieved articles from each and a link to the specific search. The search queries were run on 21/01/2022 and no articles published after that date are added. The scope of this scoping review is limited to gamification research conducted within the past five years, including 2017 through 2021 (when the search queries were conducted). After running the queries, we ended up with $n = 1754$ articles. These articles were uploaded to the Covidence literature review tool [1] to automate some of the screening process. The tool automatically detected **5** duplicate references from the results that we removed after verifying that they were, in fact, duplicates.

3.2 Abstract and Title Screening

We screened the remaining unique articles ($n = 1749$) firstly based on title and abstract, then based on a full text reading of the remaining articles. During the title and abstract screening, we only focused on whether an article mentioned at least one of the following words:

- Gamification
- Gamify
- Gamified
- Game element
- Game elements

[1] https://www.covidence.org/

- Game design element
- Game design elements

Any paper that did not mention one of the words mentioned above in the title or abstract was excluded. We also removed papers if the only contribution presented in the abstract was a synthesis of reviewed game elements. Also, duplicates were removed. We excluded $N = 813$ references during this step. Two independent researchers conducted title and abstract screening, with conflicts resolved by consensus.

3.3 Full Text Screening

After screening the titles and abstracts, we performed a full-text screening of the remaining $n = 936$ articles. Table 2 lists all exclusion criteria during this step. Even though we have a long list of exclusion criteria, the main focus was to be as broad as possible with our inclusion criteria while excluding data noise or redundant information. Hence, our exclusion criteria, **(Ex1)** and **(Ex2)** are fairly standard practices in literature reviews. This exclusion criterion ensured that we could read and understand the articles, and that they represented fully finished work. We decided to use **(Ex3)** because we only wanted original definitions included. We would like to elaborate further on our decision to exclude review papers. Review papers typically summarize the work of others without introducing new definitions or concepts, such as game elements. Therefore, we excluded review papers from our analysis to avoid duplicating information from the same original work. After an initial review of the available papers we realized that many articles would use the words "gamified" or "gamification", although they actually discussed *serious games* [1] or *games with a purpose* [44], instead of discussing *gamification*, as defined in the literature [6]. Thus, when papers discussed serious games, games with a purpose, or were lacking a non-game context, we excluded them. Finally, a sizeable number of papers only vaguely defined the gamification approach used, without naming any specific elements or named elements used in the gamification design, but did not clearly define them. These were excluded following **(Ex5)** or **(Ex6)**. For example, Sitra et al. [35] investigated the effect of badges on student engagement. In this paper, they state that they are using gamification with badges (therefore passing both **(Ex4)** and **(Ex5)**). However, they do not define what "badges" actually mean in their study, which is why the article is excluded following **(Ex6)**. Ultimately, a total of **656** papers were excluded during this step, Table 2 gives a breakdown of the number of exclusions for each criteria. It is important to note that many of the articles excluded for reason **Ex5** presented frameworks or design spaces related to gamification and only discussed high-level gamification design, similar to the aesthetics or dynamics defined by Hunicke et al. [10]. The full list of reviewed references is available on the Open Science Framework repository.

3.4 Data Analysis

From our final **280** articles, we extracted a total **1400** definitions of individual game elements. We initially grouped them by the name given by the original authors (i.e., all game elements that authors presented as "Points" were analyzed together) but there were many variations of names (e.g., Points system, Scoring system, Score, Points, Point Reward, Score Reward). Therefore, we decided to include all of these similar definitions in our analysis. After this grouping, we only analyzed game elements that were present in more than 20 articles. We chose this limit to focus only on game elements that were frequently referenced, not those that were only anecdotally used. After this filtering, we were left with 15 different game elements to analyze. We analyzed game elements by reflexive tagging. This involved going through each description and tagging the crucial themes. The themes were intended to identify important identifying aspects (or **properties**) of the game elements. Each tag was assigned only once to a given definition, even if the definition

Number	Criteria
813	Title and abstract screening
	Full text screening
7	**Ex1** The paper is not written in English
3	**Ex2** The paper is not a full paper (abstract, short paper, work in progress etc.)
12	**Ex3** The paper is not primary research (i.e. we exclude all systematic reviews, "meta" reviews etc.)
124	**Ex4** The paper does not actually present a study about gamification [6]
346	**Ex5** The paper does not clearly present which game elements were used
164	**Ex6** The paper does not clearly define said game elements
656	Total excluded during full text screening

Table 2. Number of references excluded during each of the screening steps, and the reasons for each exclusion.

mentioned that particular quality multiple times. For example, one of the points definitions: *"The user's score should be incremented by a total of 100 Donation Points(DPs) upon making a blood donation appointment and by 150 DPs if the blood donation appointment is scheduled when blood stocks are running low. In contrast, the user's score should be decremented by 50 DPs after cancelling the blood donation appointment"*. We assigned the *Numeric* property because it mentions numbers multiple times. Two researchers initially performed this step, with a third independent researcher performing a final verification.

4 ANALYSIS RESULTS: GAME ELEMENT DESCRIPTIONS

In this section, we will present each of the 15 identified game elements, and the most frequent properties mentioned in the definitions. For each game element, Table 3 and Table 4 present all the properties mentioned in the descriptions, along with their occurence percentage. Identified properties are written in italics in the following descriptions.

Table 3. Frequency of game elements identified in the papers ("#"), and properties used in the papers to define game elements

Game-Element	#	Properties (>10%)	Properties (<10%)
Achievement	22	**Goals (68,18%), Reward (54,55%)**, Complete (45.45%), Social (18,18%), Categories (18,18%), Tied to badges (18.18%), Tied to points (18.18%), Performance (13.64%)	Progression (9,09%), Unlockable (9,09%), Individual (9,09%), Invisible (4,55%), Tied to levels (4,55%), Difficulty (4,55%)
Avatar	62	**Represent player (59,68%), Customisation (48,39%)**, Shown (19,35%), Role play (11,29%)	Grows (8,06%), Usable (4,84%), Immersion (3,23%), Progression (3,23%), Social (3,23%) Removable (1,61%), Privacy/anonymity (1,61%)
Badges	148	**Reward (70,27%)**, Specific goal (37,84%), Shown (21,62%), Categories (18,92%), Social (12,16%), Progression (10,81%)	Tied to points (7,43%), Named (6,08%), Unlock (4,73%), Collectable (3,38%), Optional (2,03%), Badges level up (2,03%), Tangible (1,35%), Invisible (1,35%), Badge table (1,35%), Intangible (0,68%), Bonus (0,68%), Competition (0,68%), Usable (0,68%)
Bars	45	**Progress (82,22%), Visual (64,44%), Goal (51,11%)**	Tied to XP (6,67%), Reward (6,67%), Tied to points (2,22%), Failure (2,22%), Loss (2,22%)
Competition	23	**Social (56.52%)**, Team (39.13%), Performance (39.13%), Rewards (30.43%), Individual (30.43%), Goal (26.09%), Win (21.74%), Rankings (21.74%), Event (13.04%)	Tied to leaderboards (8.70%), Completion (8.70%), Challenges (8.70%), Bonus (8.70%), Collaboration (8.70%), Lose (4.35%)
Ex. points	22	**Reward (95.45%)**, Numerical (40.91%), Progression (18.18%), Bonus (13.64%)	Increase level (9.09%), Loss (9.09%), Exchange (4.55%), Tied to badges (4.55%)
Feedback	41	Performance (36.59%), Information (31.70%), Support (29.27%), Success (29.27%), Failure (17.07%), Instant (17.07%), Progress (14.63%), Medium (12.20%)	Interaction (9.76%), Help (9.76%), Challenges (4.88%), Leaderboard (2.44%), Personalised (2.44%), Private (2.44%)
Leaderboard	152	**Ranking (63.16%)**, Performance (42.11%), Comparison (38.16%), Competition (12.50%), Social (12.50%)	Multiple (8.55%), Rewards (3.95%), Anonymous (3.95%), Individual (3.29%)

Table 4. Frequency of game elements identified in the papers ("#"), and properties used in the papers to define game elements (continued from Table 3)

Game-Element	#	Properties (>10%)	Properties (<10%)
Levels	74	**Progression (75.68%)**, Tied to XP (45.95%), Rewards (17.57%), Increased challenge (12.16%)	Goal (5.41%), Social (2.70%), Named (1.35%), Decrease (1.35%), Invisible (1.35%)
Narrative	33	**Context/premise (54.55%), Stories (51.52%)**, Goal (24.24%), Interest (24.24%), Guidance (15.15%), Characters (15.15%), Progression (12.12%)	Player influence (9.09%), Fictional (9.09%), Immersion (6.06%), Personalised (3.03%), Experience (3.03%)
Points	192	**Reward (76.04%), Numeric (47.92%)**, Performance (13.54%), Social (10.94%)	Extra bonus (9.38%), Loss (8.85%), Exchange (7.29%), Redeemable (5.73%), Unlock (4.17%), Increase Level (3.12%), No Use (1.04%), Given for badges (1.04%), Invisible (0.52%), Tied to lives (0.52%)
Quests	88	**Task (50%)**, Rewards (22.73%), Set by others (17.05%), Timed (15.91%), Difficulty (12.50%), Set by self (11.36%), Completion (10.23%)	Social (9.09%), Progression (7.95%), Performance (3.41%), Competition (2.27%), Collaboration (1.14%), Levels (1.14%), Failure (1.14%)
Social	59	Team (40.68%), Interaction (38.98%), Cooperative (37.29%), Goal (32.20%), Contribute / share (22.03%), Rewards (18.64%), Personal achievement (16.95%)	Performance (8.47%), Help (6.78%), Compete (6.78%), Comparison (6.78%), Ranking (5.08%), Feedback (5.08%), Friends (5.08%), Roles (3.39%)
Stages	38	**Sections (73.68%), Progression (52.63%)**, Increased challenge (36.84%), Unlock (23.68%), Goal (18.42%), Reward (13.16%)	Tied to points (7.89%)
Time	27	**Failure (74.07%)**, Countdown (18.52%), Stopwatch (18.52%), Self competition (14.81%)	Performance (7.41%), Visible (7.41%), Period (3.70%), Tied to difficulty (3.70%), Tied to leaderboard (3.70%)

4.1 Achievements

Achievements were presented in 22 different definitions. They were heavily described as game elements that provide *goals* (68%) for users and that gave *rewards* (54%) when completed. Other notable properties identified were specific completion requirements (*complete*, 45%), that they can involve other users (*social*, 18%), or that they can be grouped into *categories* (18%). Achievements were also *tied to badges* (18%), *tied to points* (18%), and built upon *performance* (13%), i.e., completing an achievement would reward either badges or points).

4.2 Avatar

Avatars were presented in 62 different definitions. They generally served to *represent players* (about 59%), and most of the time, users could use *customization* (about 48%) to adjust avatars to their preferences. Interestingly, only 19% of the avatar definitions mentioned that it was visible or *shown* to users. In about 11% of the definitions, avatars were used to represent specific characters in a story allowing users to participate in the *role play*.

4.3 Badges

Badges were described in 148 instances of our dataset. In gamification, badges are often conflated with achievements, and the properties extracted somewhat reflect this. As with achievements, the definitions for badges heavily mentioned *rewards* (70%), *specific goals* (37%), and *categories* (18%). However, badges also included a visual aspect, meaning that they were *shown* (21%) to users. Finally, a few definitions also mentioned that badges were tied to *social* (12%) aspects (presented to other users, or served as social status) and could serve as markers to user *progression* (10%).

4.4 Bars

We found 45 descriptions of bar game elements. They were mainly described as a *visual* (64%) indicator of user *progress* (82%). Half of the time they are used to represent a user's *goal* (51%) achievement. This game element was fairly consistently described, with three properties in more than half of all descriptions.

4.5 Competition

Competition was referenced in 23 different definitions. Only half of the descriptions mentioned a *social* aspect of the competition (56%). 39% described a *team* participating in the competition, whereas 30% described *individual* users participating. 39% of the descriptions showed that competitions were based on user (or team) *performance* and that these competitions provided users with a *goal* (26%) i.e., win the competition. *Rewards* (30%) were given at the end of the competition which would sometimes be tied to a user's *ranking* (21%) in the social group. Finally, a few stated that competitions were tied to specific *events* (13%).

4.6 Experience Points

Experience points were referenced and described by 22 of the papers. Almost all of these descriptions stated that experience points are a form of *Reward* (95%). Almost half stated that they are *numerical* (40%) like the points game element. However, a few descriptions say that experience points represent user *progression* (18%), and some reported that experience points could be given in unexpected ways, as a *bonus* (13%).

4.7 Feedback

Feedback is not something that we would have considered a game element in itself, but rather something that a game element can provide (i.e., points based on a user's performance-provided feedback). However, it was specifically mentioned as a game element in 41 different definitions, so we included it in our analysis. A few descriptions stated that feedback game elements were tied to user *performance* (37%), gave general user *information* (31%), provided *support* in user activities (29%), or that the feedback was given upon user *success* (29%), or *failure* (17%). Feedback could also be given to inform about general *progress* (16%), or even *instantly* (17%). Finally, 12% specifically mentioned the *medium* and how it was conveyed (visually/haptic/audio).

4.8 Leaderboard

Leaderboards were described in 152 different papers. They mostly presented a *ranking* (63%) of all users, providing a *comparison* (38%) based on user *performance* (42%). A few papers mentioned a *competition* (12%) and a *social* (12%) aspect tied to the leaderboard.

4.9 Levels

Initially, we found two different types of game elements under the name levels: Levels as experience levels (i.e., personal progression markers) and levels as stages (i.e., discrete sections of an activity). In our analysis, we decided to keep experience levels under the name levels and moved stages to their own category. In this sense, levels were referenced 74 times in our data set. Almost three-quarters of these game elements tracked user *progression* in the system (74%). Just under half of the definitions stated that a user's level was *tied to the number of experience points* they gained (45%). Finally, gaining levels could also be tied to getting *rewards* (17%), or giving the users an *increased challenge* (12%).

4.10 Narrative

The narrative game element was described 33 times in our data set. About half of the descriptions mentioned that narrative game elements provided a *context/premise* for the activity (54%), and that they could be used to tell a *story* (51%). Some of the descriptions stated that narrative game elements provided users with *goals* to accomplish (24%) or helped sustain user *interest* (24%). Finally, some descriptions mentioned that the narrative involved other *characters* (15%), gave users *guidance* in the activity (15%), and provided users with a sense of *progression* (12%).

4.11 Points

Points was the most commonly referenced game element, with 192 definitions in our data set. Under this game element, we grouped similarly named game elements such as points, score, points system, or coins. *Reward* (76%) was the most frequent keyword mentioned for this game element, closely followed by *numeric* (47%). Points were rarely linked to *social* (11%) aspects or user *performance* (13%).

4.12 Quests/Goals/Challenges

Goals, challenges, and quests were defined in a total of 88 papers. Half of the descriptions mentioned that these game elements gave users specific *tasks* to complete (50%). 22% said that these game elements would provide *rewards* upon completion, with 15% mentioning that they were *timed* (i.e., had to be completed within a fixed duration), and 12% said that they were somewhat *difficult* or challenging. Finally, 17% stated that these goals were *set by people other than the users* (such as a

teacher giving a student a goal, or the system assigning a new quest), whereas 11% said that they were *set by the user* themselves.

4.13 Social

Social as a game element was described in 59 different descriptions in our data set. 40% of the definitions described users working in *teams*, 38% described general user *interaction* (such as commenting on other users' activities, sending messages), 37% mentioned users *collaborating*, often with a clear *goal* (32%), and 25% showed users *helping* others. Finally, a few mentioned possible *rewards* (18%) or *personal achievement* (16%) tied to social game elements.

4.14 Stages

As mentioned above, stages and levels were initially grouped under the same name, but we ultimately split them into two categories. Stages have described a total of 38 times in our data set. Almost three-quarters of these descriptions stated that stages were used to break up content into *sections* (73%). About half said that this was done to give users a sense of *progression* (52%) with later stages linked to *increased challenge* (36%) which means that content became more and more difficult as users progressed. Interestingly, only 23% of the descriptions mentioned that completing a stage would *unlock* the next one. 18% of the descriptions said that these stages provided users with *goals* in the system. Finally, completing a stage sometimes provides some kind of *reward* (13%).

4.15 Time

Time was referenced as a game element in 27 different definitions. Most of the definitions mentioned that time running out resulted in user *failure* (74%). Some of the definitions were more specific on how the time was counted, either counting up like a *stopwatch* (18%), or functioning as a *countdown* (18%). Some definitions also mentioned that users could try to improve their times through *self-competition* (e.g., try to complete a task faster than the last one (14%)).

5 DISCUSSION

We conducted a scoping review of gamification research in the last five years. Our analysis focused on the game elements that have been used, how the authors have described them, and the underlying properties to which these authors refer when describing these elements.

We identified 15 different commonly used game elements and found that Points, Badges, and Leaderboards are the most frequently used ones (**RQ1**). However, we also found that progression plays a major role, because game elements such as Levels and Quest/Challenges/Goals were also frequently used in the gamification literature. In general, these findings are consistent with existing systematic literature reviews from 2014 and 2015 [8, 33]. Therefore, it seems that the set of gamification elements used in recent gamification research is similar to those used a decade ago. On the one hand, this could mean that these game elements are particularly effective or well-perceived by users. In fact, previous research has shown that these game elements can have a positive impact on basic psychological needs [32] (as defined by Self-Determination Theory [31]) or can act as progress indicators, increasing user performance [25]. However, on the other hand, the dominance of these game elements in the gamification literature may also fuel the ongoing criticism that gamification is labelled *pointsification*, because of excessive reliance on scoring systems, thus using the least exciting part of a game [29].

However, positive is that Points were among the most coherently defined game elements in our analysis (two or more properties were referenced more than 50% of the time). The remaining frequently used elements were rather consistently defined across the literature, having at least one property present in more than 50% of the definitions. This suggests that the research community

has a quite coherent understanding of the game elements that are frequently used. Future research could explore whether the frequent use of game elements leads to a more widespread shared understanding of what constitutes them or whether a clearer picture of what constitutes these game elements leads to more widespread usage. This raises questions about cause and effect that represent an interesting research direction for future work. On the negative side, it should be noted that a large amount of research papers do not properly define or name the game elements they use. Although some game elements share many underlying properties, they do not share all of them. This means that when implementing these elements, there is still room for interpretation. Thus, with respect to **RQ2**, we can conclude that the same names are being used for game elements relying on a different set of underlying properties. The extent to which these properties are being shared differs between game elements, but overall represents a threat to (external) validity of research findings and should be tackled by gamification research in the future.

To pave the way for the solution to this problem, our analysis of the underlying properties of each game element could be an important first step (**RQ3**). We have seen that the number of properties and the weight of each single property in representing the respective game element varies between elements, and that relationships between game elements exist, which should be further researched. In the following, we will leverage our findings to discuss how they can be used to increase the validity of future research in the field of gamification.

5.1 General Recommendations for Game Element Reporting

The first thing we recommend to researchers when describing their gamified approach is to be clear about the game elements they are using. From our filtering process we found that more than half of the potentially eligible papers did not clearly state the game elements used in the system and that a quarter of them did not define game elements when named. For example, Denden et al. [4] was one of the papers we excluded for not properly defining the game elements they used. Table 1 page 2 lists the game elements they asked participants about: "Levels," "Points," "Badges," "Virtual Goods," "Leaderboards," and "Feedback," and these elements are never defined nor described in the rest of the paper. As our analysis shows, "Badges" could mean "**Rewards** given for **specific goals** that users can **show off** on their profiles giving them a **social status** symbol" or "**Named Rewards** that belong to one of three different **categories** (speed, accuracy, dedication)." These two definitions might seem somewhat close but could be different enough to motivate and engage users differently.

5.2 Game Element Properties: Towards Defining Game Elements

Based on the properties identified for each game element, we discuss the descriptions of game elements and provide a first step towards coherent game element definitions. The description of each element is based on the findings of our research. For example: A game element *is/has* a certain way, if a feature is described in more than 50% of the respective descriptions. A game element *often* has a feature, if the feature is described in 30–49% of the analyzed descriptions. A game element *can be* a certain way, if a feature is described in 10–29% of the analyzed descriptions.

We identified 15 different game elements being used in more than 20 papers in our dataset. Of these 15, we could only identify six that have a strong cohesive definition (*i.e.,* two or more properties present in at least 50% of the definitions).

Achievements *are* specific goals for users that grant rewards when completed. They *often* have specific completion requirements, and *can* be tied to user performance, involve other users in social interactions, getting sorted into categories, or tied to points or badges, rewarding users

with one of these or completed when certain badge or point thresholds are attained. This focus on completing goals is similar to other researchers describing this game element [14, 27].

Avatar *is* a representation of the user. They *often* provide them with some customization options (*e.g.,* selecting their own avatar from a preset list, decorating with different visual items). This avatar *can* be shown to others, and *can* represent a specific character (*i.e.,* historical figure, superhero etc.). Past research focused also on the visual aspect of avatars, and less on customization options [27, 46].

Bars *are* visual progress trackers that provide users with a goal to achieve in the system. In past research, this element has often been more broadly referred to as *Progression*, focusing on milestones [33] and progress towards them [39]. We found different elements operating on progression (Stages, Levels, Bars) since they did have different descriptions in the reflexive tagging.

Narratives *are* elements that provide a context or story for the activities and engage the users. They *can* also provide a goal for the users, guide them on what to do next, involve multiple distinct characters, or provide a sense of progression through activities. While past research confirmed the aspect of providing context [38, 39], the aspect of connecting game elements mentioned in [15] has not become evident in our analysis.

Points *are* simple numerical rewards. They *can* evaluate user performance, or provide a certain social status. This is in line with descriptions of Points in past research focusing on numerical rewards [15, 21, 39] and evaluating performance [33].

Stages *are* game elements that break up activities into discrete sections to provide users with a sense of progression through the content. They *often* provide more and more difficult content as user progress in later stages. Completing a stage *can* be seen as a goal for users, unlock the next stage, or provide some other kind of reward. Past research has mostly talked about Levels without focusing on discrete sections. However, providing users with a sense of progression [15] and more and more difficult content [33] was also part of these descriptions.

Seven of the remaining game elements had a weaker but still commonly agreed upon definition (*i.e.* at least one property present in at least 50% of the definitions):

Badges *are* rewards for the user. They *often* provide users with specific goals. They *can* have a visual aspect, can be of specific categories, show user progression, or provide a social status symbol. Interestingly, other reviews mainly focused on the visual aspect of Badges [15, 33]. While this visual aspect was also found in our analysis, we primarily found them to be seen as rewards that can represent goals, which is similar to how Lessel et al. [21] characterized them.

Competition *is* a social game element. Users *often* compete as teams or individual and often gain rewards based on performance. A competition *can* provide a goal for users, *e.g.*, to gain a certain ranking or win. It can be some kind of event. The social aspect, the focus on goals and teams or individuals competing against each other is in line with past reviews [15, 21, 39].

Experience Points *are* a form of rewards, that are *often* numerical. They *can* show user progression and can be given as unsuspected bonuses. Existing literature reviews seemed to subsume Experience points within Points. Thus, it seems they neglected the progression aspect of Experience points and rather focused on performance aspects [15, 33, 39]

Leaderboards *are* game elements that provide a ranking for users. This ranking is *often* based on user performance, and allows users to compare themselves to others. This *can* be combined with competition or include social aspects. Past research also mostly focused on these attributes [12, 15, 33].

Levels *are* a way to provide users with progression within the system. They *often* are tied to experience points, *can* give rewards when a user increases in level, and higher levels can see users facing more and more difficult challenges. Progression has been part of other descriptions in the past [15], so has been gaining rewards for completing levels [39] as well as increasing difficulty [33].

Quest/Challenge/Goals *are* game elements that give users specific tasks to do in the gamified system. These tasks *can* give some kind of reward after completion. They can be set by others or by the user directly. These tasks can be timed and can be more or less difficult. While the focus on completing tasks and receiving rewards is supported in past descriptions [15, 38], other descriptions has more focused on quests guiding users in the gamified system or game [38, 39], which was less evident in our analysis.

Time *is* a game element that provides a limit on users before they fail a task. They *can* either be in the form of a stopwatch or countdown (*i.e.*, timer increasing or decreasing). They can also provide a means of self-competition for users. This element has often not been part of other reviews in gamification literature. However, when they were included, previous research focused primarily on the time pressure they induce [15, 39].

Finally, two of the game elements named in the dataset did not show cohesive definitions (*i.e.*, no properties present in over 50% of the definitions). These game elements were not strongly defined in literature, having vastly different definitions in the dataset. Because of this, we cannot provide a strong definition for these game elements, but we can give an idea of different forms these can take. It is also possible that these two game elements are more akin to the Dynamics level from the MDA framework by Hunicke et al. [10] or Mechanics from the DMC framework by Werbach and Hunter [46]. In both of these frameworks, these levels describe game interactions and/or behaviours generated from specific game elements, *e.g.,* **Points** can be used to give *Feedback* to users. **Quests** can involve multiple players, encouraging *social* interaction. In any case, these two were often referenced in our dataset, and we will describe the properties that were often cited.

Feedback *often* gives users information, which is often linked to their performance. It *can* offer encouraging messages of support, triggered by users' success or failure. This feedback can be instantaneous, or gradual linked to progress. Finally it can use various mediums to convey the message (haptic, visual, audio etc.). Though Feedback being a quite broad game element, descriptions in past research also focus on providing relevant information for the user [15, 38] which can be linked to performance [11].

Social *often* groups users into teams, promote interaction between users, or encourage them to cooperate for common goals. It *can* also give users a way to contribute or share content or messages which can provide users to share their personal achievements. Finally, this game element can also serve as a reward. Often referred to as Collaboration or Cooperation, past research agrees on these attributes [15, 21, 39].

5.2.1 What Characterizes Game Elements? Based on the aforementioned characterizations of game elements, we discuss commonalities between them to pave the way for a better understanding of what constitutes a game element.

When reflecting on common characteristics and properties, we can conclude that game elements provide *structure*: They help define the rules, objectives, and progress, making it easier for users to understand and engage with the system. They also aim to enhance the *user experience* by increasing intrinsic motivation. This may be achieved by satisfying the basic psychological needs of competence, choice and relatedness, as described by Self-Determination Theory [31]: Achievements, Feedback, Badges, Levels, Bars, Points, Experience Points, Stages, Time, and Quests may satisfy the

need for competence. Avatar, Customization, and Narrative may add to the basic need for autonomy. Finally, Social, Leaderboard, and Competition may increase relatedness.

Thus, as a step towards better understanding what constitutes game elements, we suggest that a game element in gamification can be described as *a building block providing structure by explaining the rules and objectives, which aims to increase the user experience by satisfying the basic psychological needs of competence, choice, and relatedness, through the use of rewards, specific completion requirements, customization, and choice as well as means of socializing.*

6 CONCLUSION AND FUTURE WORK

In this paper, we have surveyed and analyzed descriptions of game elements drawn from 280 gamification research papers from the past five years. Our goal was to analyze which game elements are commonly used, whether there was a consensus amongst authors on the definitions of used game elements, and which properties were commonly referenced when defining game elements. Our analysis revealed that a total of 15 game elements have been commonly used in the reviewed works and that the most frequently used game elements did not change substantially compared to previous reviews of the gamification literature. Regarding game element definitions, we found that most of the work did not define or describe the game elements used at all. This is concerning as it threatens the (external) validity of empirical results and makes it harder to replicate findings. To prevent this, we provided recommendations on how to report game element use.

Regarding the coherence of game element definitions, we found that the share of properties between provided definitions differs (i.e, while some game elements were defined relying mostly on the same properties, other elements were defined by relying on a broader range of properties with less overlap). Our work is the first to identify six game elements with clear definitions out of 15 found in 280 gamification literature papers. We also found seven game elements with weaker definitions and two elements with problematic definitions that may be more like dynamic outcomes than design elements. We showed that six of the 15 game elements had a strong consistent identity (i.e., two or more properties that were referenced more than 50% of the time)—**Achievements**, **Avatars**, **Bars**, **Narrative**, **Stages**, and **Points**. Seven of the 15 were less consistently defined, but still had at least one property present in over 50% of definitions: **Badges**, **Competition**, **Experience Points**, **Leaderboard**, **Levels**, **Quests**, and **Time**. Finally, two of the 15 did not have a strongly defined identity, with no properties in more than half of the definitions: **Feedback** and **Social**. On a meta-level, we used these findings to provide descriptions of game elements as a first step toward coherent definitions.

In future work, our findings should be complemented by qualitative analyses of game elements (e.g., by interviewing gamification experts or conducting workshops to enrich the understanding of the identified properties and shed light on the relationships between them). This, together with our findings, may be used as a basis to establish and inform a framework of game elements, which could be used to report and define game element usage in gamification research. Moreover, analyzing potential differences of game element usage across different domains (such as education, health, or crowdsourcing) as was done in previous literature reviews on gamification [8, 15, 33] would be an actionable next step.

Our research has broken new ground in clarifying the definitions of game elements in the gamification literature, identifying six of 15 elements with a strong consistent identity. We have also flagged seven elements as less consistently defined, but still presenting a crucial property in more than half of their definitions. However, Feedback and Social stand out as problematic, lacking a strongly defined identity. This exploratory effort is just the beginning; we have laid the groundwork for a unified understanding of game elements. We encourage further scholarly pursuits

in this field to refine and expand these definitions. This will ensure a more coherent, precise, and effective use of game elements in gamification strategies.

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