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Author(s): Selay Arkün Kocadere and Şeyma Çağlar

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Gamification from Player Type Perspective: A Case Study

Selay Arkün Kocadere* and Şeyma Çağlar

Department of Computer Education and Instructional Technologies, Hacettepe University, Turkey //
selaya@hacettepe.edu.tr // seymacağlar@hacettepe.edu.tr

*Corresponding author

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ABSTRACT

Studies highlight the need to consider different player types during gamification design. The aim of the present study was to determine the elements that affect learners showing different player type characteristics in a gamified learning environment. Accordingly, the study examined which game elements trigger which mechanics. The design of the study's gamified learning environment used the game elements of leaderboard, achievements, point, badge, content unlocking, level, gifting, team, and story which were thought to motivate different player types. A total of 41 undergraduate students participated in the study for 7 weeks. Using the "Player Type Scale" developed by the researchers, player types were determined as killer, achiever, explorer, and socializer. One learner showing the dominant characteristics of each player types were interviewed to determine which elements each learner liked, disliked, or was indifferent to and which mechanics these elements served. Results indicated that: (a) players may show characteristics different than their player type depending on the design features of the gamified learning environment, (b) the mechanics that attract learners in a gamified learning environment differ with regard to player type, (c) the elements that trigger a mechanic differ in with regard to player type, (d) an element may serve different mechanics for different player types, and (e) the selection of elements and the context in which they are used in the design affects the mechanic it serves and therefore the whole process.

Keywords

Gamification, Player type, Game mechanics, Game elements

Introduction

The needs of modern learners have changed in accordance with the development of technology and the evolution of the learning environment. Educators often use games and game-like environments to attract learner attention during the instructional process. Although interest in gamification has only recently become widespread, the term "gamifying" can be seen as early as the 1980s. Bartle described the act of "gamifying" an online system as "turning something not a game into a game" (Werbach & Hunter, 2012). A variety of definitions for this term have subsequently appeared in the literature, including:

- "The process of game-thinking and game mechanics to engage users and solve problems" (Zichermann & Cunningham, 2011),
- "A simple concept of making non-gaming systems more engaging through applying gaming principles to them" (Bishop, 2014), and
- "The use of game elements and game-design techniques in non-game contexts" (Werbach & Hunter, 2012).

In the educational context, gamification can be described as an educational approach using game design principles in the learning environment to engender interest and motivation in learners.

Several studies on gamification in the educational context have reported that it increases participation in online learning environments (Hew, Huang, Chu, & Chiu, 2016; Barata, Gama, Jorge, & Gonçalves, 2013; Caton & Greenhill, 2014), motivates learners during difficult assignments (Hew et al., 2016), and produces more qualified learning products (Buckley & Doyle, 2014). In addition, the game mechanics and elements used during gamification of the learning environment lead to a greater level of entertainment (Hew et al., 2016; De-Marcos, Domínguez, Saenz-de-Navarrete, & Pagés, 2014), engagement (Akpolat & Slany, 2014), motivation, and flow (Kocadere & Çağlar, 2015). Additional positive results include increased voluntary participation in activities in the learning environment (Iosup & Epema, 2014). However, to avoid clouding the potential positive effects of gamification, gamified learning environments must be designed correctly and the differences in learners' individual differences and motivations must be taken into consideration (Ferro, Walz, & Greuter, 2013; Ibanez, Di-Serio, & Delgado-Kloos, 2014). For this reason, Werbach & Hunter (2012) reported that the characteristics of different subgroups such as player types must be kept in mind during the design of gamified learning environments.

Several studies have categorized players into types. Studies by Bartle (1996), Ferro et al. (2013), Fullerton (2014), and many others have been conducted to determine the ways in which players behave and to categorize them accordingly. Bartle's (1996) "Multi-User Dungeon" study examined players' expectations and produced the first effort at player categorization, classifying players using their act/interact preferences and orientation (world/player). He visualized this classification on a coordinate plane, with "world/player oriented" on the x-axis and "act/interact" on the y-axis, producing the four categories of killer, achiever, explorer, and socializer. Similarly, Ferro et al. (2013) described five different player types, dominant, objectivist, humanist, inquisitive, and creative, basically adding the creative type to Bartle's classification. Later, Fullerton (2014) defined nine different player types: competitor, explorer, collector, achiever, joker, artist, storyteller, performer, and director. With this categorization, it can be said that Fullerton (2014) separated and assigned Ferro et al.'s types (2013) into more than one category. In the current study, we chose Bartle's (1996) player type categorization as our basis, Bartle's classification is considered the most fundamental method of categorization (Ferro et al., 2013) and has been recommended by Werbach and Hunter (2012) for use in gamification. Additionally, these types were developed for use in multiplayer video games which is also used in gamification (Nicholson, 2014).

In Bartle's classification (1996), killers try to dominate other players by "acting on the people" in the environment. This type of player is not interested in completing assignments well or scoring high points but instead aims to achieve scores that are sufficient to dominate and beat others. Killers explore the game to learn new ways to harm other players. They tend to communicate with others only to humiliate them.

Achievers "act in the world" and care about the assignments in the environment in order to win. This kind of player determines goals and put active effort into reaching those goals and increasing their scores as much as possible. Achievers only socialize to learn what other players know about earning points. The possibility of earning points most induces this type of player to explore the learning environment. Achievers only care about their own scores and assignments in the environment and are usually not interested in other players or in harming them. However, achievers may want to harm players that earn a high score or prevent them from earning rewards. The achiever type tends to brag about the levels they have reached and how quickly they have reached them.

The explorer "interacts with the world". They want to explore the environment and discover as many new things as possible. Explorers usually look for bugs and facilitators in the game. Earning points is a boring activity that is only useful for exploring the next level. This type of player only wants to socialize if it will lead to new exploration and may want to harm others if they are prevented from exploring in the environment.

The final type, socializers, "interact with the people" in an environment and usually take advantage of the communication function to socialize. This type of player explores the game with the aim of discovering what other players are talking about and only feel the need to earn points to be able to reach new communities. Socializers tend to only harm those who harm their friends. In other words, socializers' only aim is to foster good communication and meet new people and develop good friendships.

Individuals may show different player type characteristics depending on context and environment (Ferro et al., 2013). The most obvious example of this would be that a socializer, whose primary goal is to make new friends and to communicate, may turn into a killer when their friend is harmed. Moreover, it is possible that individuals can show characteristics of another player type in addition to their dominant primary style (Bartle, 2005). Indeed, studies determining player types have indicated that individuals may exhibit not only one dominant player type characteristic but instead show more than one type of player type characteristics (Herbert, Charles, Moore, & Charles, 2014).

While research emphasizes the importance of keeping player types in consideration in gamification design (Werbach & Hunter, 2012), only a few studies in the literature focus on these different player types. Ferro et al. (2013) categorized players into player types determined by researchers such as Bartle (1996), Caillois & Barash (1961), and Fullerton (2014) and examined their personality traits based on these types. Ferro et al. (2013) tabulated game elements and mechanics that can be used in a gamified learning environment with regards to the player types they determined in the theoretical analysis. The authors suggested the following mechanics for each player type: (a) leaderboards, progress bars, statuses, achievements, combos, and points for the killers; (b) badges, bonuses, combos, levels, progress bars, and reward schedule for achievers; (c) quest, rewards, and story elements for explorers, and (d) quest, customization, and story for socializers.

While not focusing on player types directly, Kocadere and Samur (2016), like Ferro et al. (2013), suggested the use of elements in gamified learning environment design based on Bartle's player types. The authors suggested

the use of leaderboards, points, and challenges for the killer player type; achievements, badges, social graphs, and progress bars for achievers; content unlocking, stories, collections, and unexpected elements and events for explorers; and gifting and teams for socializers.

Studies performed by Herbert et al. (2014) and Barata et al. (2013) clustered participants in the gamified learning environment and conducted a review based on combined player types. Çağlar and Kocadere (2016) examined the motivation levels of combined player type participants in a gamified learning environment. We were unable to find a study in the literature specifically examining the elements that attract individuals who show characteristics of a dominant player type. Although Ferro et al. (2013), and Kocadere and Samur (2016) touched on this subject with their theoretical analyses, they emphasized that their suggestions needed validation with applied studies. In this context, the current study on player types in gamified learning environments aims to determine which elements are attractive to each dominant player type during the 7-week use of a gamified learning environment developed by the researchers. In addition, the study aims to analyse the relationship between mechanics and elements for each player type. Research questions are given below:

- Which mechanics attract each of the four player types in the environment and which elements serve these mechanics?
- Which mechanics do the four types dislike and which elements serve these mechanics?

Our study ultimately aims to fill the gaps in the literature on choice and the role of elements in the design of a gamified learning environment.

Method

The study was designed as a case study based on interviews with participants. Participants used the gamified learning environment for seven weeks. The research process consisted of four phases; (1) the design of the gamified environment, (2) the development of the player type scale, (3) the use of the gamified environment and the determination of the participants' player types, and (4) the review of cases that show dominant player type by interview.

Design of gamified online learning environment

A gamified online learning environment was designed for use in this study. In the design of this environment, emphasis was made to include elements not generally present in the literature beyond just those of badge and leaderboard (Kapp, 2012). Based on previous theoretical studies, a variety of gamification mechanics and elements thought to attract different player types were used. Game elements serve mechanics and directly affect the game design. Mechanics are more general structures. In gamified learning environments, there may be one or more elements that trigger every mechanic (Werbach & Hunter, 2012).

Game mechanics thought to attract different player types were determined as follows: competition, status, progression, resource acquisition, reward, cooperation, transaction, and narrative. Elements expected to trigger these mechanics in the gamified learning environment were determined as: achievement, badge, content unlocking, gifting, leaderboard, level, point, team, and story. These mechanics and the elements thought to serve those mechanics are shown in Table 1.

Table 1. Mechanics and the elements used to trigger them

Element/ Mechanic	Leaderb.	Point	Content Unlock. & Level	Badge	Achiev.	Gifting	Team	Story
Narrative								X
Competition	X	X	X					
Status	X		X	X				
Progression		X	X		X			
Resource acquisition					X			
Reward				X	X			
Cooperation							X	
Transaction						X		

Selected elements were incorporated into the environment. The online learning environment was arranged so that each week corresponded to one level. Each level included assignments suitable to that week's subject. Assignments were varied, such as discussing in forums, reading an article, or putting together a presentation. Some assignments were individual and others required teamwork. In the realization process of this design, learners were awarded points for completing assignments. In the scoring phase, student work was reviewed for quality. Learners were placed on a leaderboard with the points they earned. Badges were used as a sign of status and given to the top three scorers and those who reviewed additional content. Only those with a certain score were able to pass onto the next level and those learners without a score sufficient to unlock the content could receive points from their peers using a gifting element. Players who unlocked the next level by obtaining the required score by themselves were rewarded with achievements that benefited them in the next levels. Levels, badges, and achievements were used in accordance with the story as suggested by Çağlar and Kocadere (2015).

Participants

For the development of the Player Type Scale, data were obtained from 197 undergraduate students enrolled in the Department of Computer Education and Instructional Technology at 7 universities in different cities. A total of 41 undergraduate students from the same department completed the designed scale and participated in the gamified learning environment in the context of a course. In the final phase of the study, 4 of the 41 participants were selected considering their primary player types and 1 participant representing each player type was interviewed in depth.

Data collecting tools

Researchers developed the "Player Type Scale" to determine player type. Keeping in line with the literature, our scale was based on the 4-type theoretical structure proposed by Bartle (1996) and players were categorized as killer, achiever, explorer, and socializer. A total of 19 items on the 4 factors were developed. Two experts were consulted to review the items. Those items appearing to refer to more than one factor were corrected so that each item corresponded to one factor only. A total of 12 items, 3 per factor, were finalized. Two students reviewed the items for clarity and no changes were made. Items were compiled into a 9-point Likert-type scale.

Suitability of the data for the factor analysis was tested using the Bartlett's Sphericity Test and the Kaiser-Meyer-Olkin (KMO) measure. The Bartlett's Sphericity Test was meaningful and the KMO value was .866. A KMO higher than .50 indicates an appropriate data structure for factor analysis in terms of sample size (Çokluk, Şekercioğlu, & Büyüköztürk, 2010). Confirmatory factor analysis tests a pre-defined structure to determine whether it is confirmed as a model (Çokluk et al., 2010). Since scale items were made on the grounds of theoretical infrastructure, factor analysis was applied.

The Chi-square (105.98) / Degree of freedom (47) ratio was 2.25, below the threshold of 3 and indicating perfect fit (Çokluk et al., 2010). RMSEA value was .075, also indicating good fit according to Jöreskog and Sörbom (1993) (Çokluk et al., 2010). Fit indices values were NFI .96, NNFI .97, CFI .98, IFI .98, and GFI .92. The item-total correlation, a test of the relationship between the item values and total values, was between .441 and .806. Item-total score correlations above .30 show good differentiation of individuals (Büyüköztürk, 2009). The credibility coefficients, demonstrating questions' similarity or proximity, was .84 for the killer factor, .813 for the achiever, .801 for the socializer, and .911 for the explorer. Coefficients over .60 are considered credible (Kalaycı, 2006). In addition to the scale, a semi-structured interview form was used to understand what gamification elements were sought in the environment by each dominant player type.

Data analysis and trustworthiness

In the analysis of data obtained in the interviews, elements were grouped depending on whether participants viewed them in a positive or negative way. Elements deemed to be neither negative nor positive or that did not affect the players were placed in the neutral group. Mechanics triggered by these elements were reviewed. Data were analysed independently by two researchers. Participants were interviewed again for analyses that did not match until the two researchers reached a common conclusion. Findings were then confirmed by the participants. To increase trustworthiness, the research process was described thoroughly, data obtained from interviews was reported with quotes, the limits of the study were defined, and all findings were compared to the studies in the literature.

Findings

Data was taken from interviews with participants showing dominant characteristics on the scale. The views of each learner are supported with their own words. For each player type, mechanics that positively or negatively affected the player and the elements that trigger those mechanics were determined. Elements that did not affect the players were also defined. As these elements had no effect on participants, they did not trigger any mechanics to record.

Case 1: Killer Kate

Kate was determined to be a “killer” using the scale and was most attracted by the mechanics of competition and status. For Kate, the leaderboard and point elements served as competition mechanic:

Leaderboard: “Every day I open the system and check out who did what (...) on the leaderboard (instead of top 10 etc.) I check the classroom ranking and calculate how to surpass people.”

Point: “If there were no points, I would not have done any assignments. (...) Without the leaderboard, there would be no competition. For example, I, for one, look at my friend’s point and plan accordingly. If they have 100 points and I have 92, I plan to read an article to surpass him.”

Status also attracted Kate and she was triggered by the leaderboard and level elements:

Leaderboard: “Right now, I like the system because I am in the top 5. I like that people see that I am in top 5 too.”

Level: “If I am doing two assignments, I should have a priority; that is why those levels are very important.”
The badge, achievement, and story elements were neutral and did not affect Kate:

Badge & Achievement: “It does not even occur to me look at the badge and achievement on my profile. I only look at the leaderboard and the badges do not affect me much. I only viewed badges in the first week. I am not interested in achievements at all.”

Story: “There is a goal and order because of the story. (...) It may be used to attract those who are not interested in the system but it does not affect me much.”

Kate was negatively affected by the gifting and team elements and did not like the team element because she thought it would curtail her personal status:

Team: “I do not want to do teamwork. When I work individually, my performance is more apparent. When it is with a group, it gets curtailed.”

Kate did not like the gifting element because it indirectly served the competition:

Gifting: “I do not want to give my friends any points. I want to show up on the leaderboard.”

Case 2: Achiever Arnold

Arnold showed characteristics of the “achiever” and was positively affected by the elements of progression, competition, and resource acquisition. According to Arnold, the level and point elements triggered the progression mechanic:

Level: “When I advance, it feels like the former subject is closed. If we stay in the same level constantly, there would be a lot of accumulation in terms of work load. But logic for progression is like that in games, that is why I like the concept of levels.”

Point: “I believe there should be points for every activity in the environment because that is how you advance. What is determining (the progression) are the points.”

For the achiever, the leaderboard triggered the competition mechanic:

Leaderboard: “(If there were no leaderboard), no one would have competed then, including myself. For instance; you share things on the forum and I would not have done it on my own. The leaderboard encourages me. (...) In a competitive environment, you consider your counterpart; for example, if I had not seen their point, I would not put an effort into catching up with them. Because I might think maybe there is a lot of gap. Points motivate me too.”

In addition, the achiever believed that the achievement element served as resource acquisition and was therefore interested in obtaining them:

Achievement: “As long as achievements have a purpose... I mean, there was a pair of binoculars for example, the ones who had taken it would have been exempted from the quiz. It feels better if you feel like you are using it after collecting, as long as it has a purpose. It is not for nothing, or just an icon. It has a purpose. Binoculars (an achievement) for example, made sense to me. I am putting an effort into obtaining them. That is why I view them positively. Because they motivate me. That is why taking them feels like you are using it, because it has a logic.”

The badge and story elements did not affect or motivate Arnold the Achiever. He explained that the story was part of the overall narration and therefore neither bothered nor attracted him:

Story: “(I like) competition more than the story’s content. That pulls me into it. Of course, the story must be in accordance with the general structure. It does not bother me, so it is alright.”

Arnold reported that he had no desire to earn badges that did not advance his status and did not view them as a resource acquisition but only as a collection:

Badges: “(Badges) are like a decoration, an icon. I do not have such a desire (to collect badges). Honestly, I did not check it out thoroughly. I usually check the leaderboard. If (the badges) had a purpose or anything, of course I would have wanted them. I mean, had it made me feel special, I would have wanted them.”

Arnold had negative associations with the gifting and team elements due to a dislike of giving or taking points and difficulties during work sharing:

Gifting: “I would not like to give points to a friend. Because it is an assignment and it is up to him to do it or not. It should be themselves making up for it, not anyone else. I would not like receiving or giving points.”

Team: “I believe the majority of assignments must be individual. Because everyone does not contribute the same in team work. There are difficulties with work sharing and contributing at the same level.”

Case 3: Explorer Emma

The mechanics that attracted Emma, who exhibited characteristics of the “explorer”, were narrative, progression, and reward. Emma reported that the narrative mechanic was triggered by the story element:

Story: “(Thanks to the story) we do our homework, yes, but we also feel like we are right in an adventure. The creativity of the environment forces people to be like that. (...) (Without the story) my activity would have decreased. Like I said, there is an inaction.”

The progression mechanic was triggered by the level element:

Level: “This way (because of levels) it is more disciplined and planned. (...) It goes on step by step, because it carries on from easier to difficult or in an increasing way, it always contributes.”

The reward mechanic was triggered by the badge and achievement elements:

Badge: “Let’s say I have done this homework, when I see (the badges I earned) I say: “I shall work harder, be the first, get that badge...” It is gamified when you say it like that. (Badges) like I said increases activity. (...) The badges are a reinforcer. They affect the student. (...) They affect me. I was really happy when I became the first in one week, honestly, there is a desire to earn badges.”

Achievement: “I missed (an achievement) by three points last week. I get sad (when I miss them). I say let me take a look at the online environment, check it out, what happened. There was no such thing in the beginning, it became more frequent later. We keep collecting these tools (achievements, collection items). It also ensures participation. When I think about it as a reward, it pushes me towards the next step.”

The elements of points, leaderboard, and gifting were described as neutral:

Point: “I would have participated (even if there had not been any points for completion of assignments). In the end, we are using the environment even if there are no points.”

Leaderboard: “(If I rank my priorities) being in the leaderboard is at the end. It does not mean much. In the end, my goal is to understand whatever is taught in this class. That is why I can put it at the bottom.”

Gifting: “If (my friend) did not reach to that point because of a very very unfortunate, very very serious situation, I would share my points.”

Finally, Emma did not like the team element:

Team: “I prefer individual assignments. In a general sense, team work causes problems in every way. Both in terms of individual responsibility and the progress and completion of the assignment. In terms of time. In terms of individuals’ own personal characteristics.”

Case 4: Socializer Sarah

Sarah showed “socializer” characteristics on the scale and was attracted by the mechanics of narrative, cooperation, and transaction. According to Sarah, the narrative mechanic was triggered by the story, badge, and achievement elements:

Story & Achievement: “Had there been no story, none of the things earned (achievements) would not have existed. Like binoculars, boats. One feels really nice after earning them. They say “Oh, how nice, now I have binoculars”. Like, they feel that they are in the game. It is good in that sense.”

Badge: “Badges are nice too. They are, like, complementing the story. This is gamified because this is why people get caught up in the game.”

The cooperation mechanic was triggered by the team element:

Team: “I put in an effort for team work in the environment. We do the homework together, so I feel like I’m responsible for them.”

In addition, Sarah reported that the gifting element triggered the transaction mechanic:

Gifting: “Even if I do not get back the points I give, I would like to give points to my friends. What was good about this system was allowing them to unlock things with points I gave them.”

There were no elements that Sarah did not like in the environment. However, the socializer was not affected by the leaderboard, point, and level elements:

Leaderboard: “(The leaderboard) does not cause much problem. It does not mean much to me that everyone shows up on the leaderboard. Being in the top three or five comes last for me.”

Points: “I earned as many points as the class required but the points did not affect me much.”

Level: “It is good that there are levels. I can see where I am but it does not really affect me.”

Discussion and conclusion

The gamification approach has received significant recent attention and positive results have been observed (Hew et al., 2016; Buckley & Doyle, 2014; De-Marcos et al., 2014) in terms of improving the learning process. In this approach, however, a qualified design is necessary to achieve these positive effects. While various studies (Werbach & Hunter, 2012; Ferro et al., 2013) have stated that player types must be taken into account in gamification design, further applied studies focusing on gamification design and player types are needed. The aim of the current study was to analyze the relationship between mechanics and elements in a gamified learning environment and which gamification items attract or do not attract the player types.

In this study, findings were evaluated in terms of the elements that (a) affected the player in a positive way and the mechanics those elements served, (b) affected the players in a negative way and the mechanics those elements served, and (c) did not affect the players in any way. Findings related to (a) and (b) are summarized in Table 2. Elements viewed as neutral (c) were not placed in the table as they did not trigger any of the mechanics.

Table 2. Elements – mechanics that affect different player types positively or negatively

Player type	Killer		Achiever		Explorer		Socializer	
	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative
Competition	Leaderb Points	Gifting	Leaderb					
Status	Leaderb Level	Team						
Progression			Points Level		Level			
Resource Acquisition Narrative			Achiev.			Story		Story Badge Achiev.
Reward					Badge Achiev.			
Cooperation Transaction				Team Gifting		Team		Team Gifting

As can be seen in Table 2, the killer type was positively affected by the competition mechanic that allowed her to dominate other players and by the status mechanic that increased her reputation. The achiever was attracted to the competition mechanic, which provided the competitive environment, and to the progression and resource acquisition mechanics, which provided a sense of progression and facilitated movement, respectively, through the environment. The explorer type was positively affected as well by the progression mechanic, which allowed them to explore while progressing, the narrative mechanic for creating a feeling of being immersed in the environment, and the reward mechanic, which was perceived as part of the narrative. The socializer type was attracted by the cooperation and transaction mechanics to interact with others in the learning environment. In addition, the socializer was positively affected by the narrative mechanic, which allowed her to feel part of the environment. It can be concluded, the mechanics that attract learners in a gamified learning environment differ depending on the player type.

In terms of elements, the killer type liked the leaderboard, points, and levels; the achiever the leaderboard, points, levels, and achievements; the explorer the levels, story, badges, and achievements; and the socializer the story, badges, achievements, team, and gifting elements (Table 2). In the literature, it has been reported that players classified under the killer type tend to be interested in the leaderboard and point elements; while those classified as achiever are interested in the level and achievement elements; the explorer the level, story, and badge elements; and the socializer the team, gifting, and story elements (Ferro et al., 2013; Kocadere & Samur, 2016). Differently from these studies, in the current study, players classified as the killer type reported positive associations with the level element; the achiever with the point and leaderboard elements; the explorer with the achievement element; and the socializer with the badge and achievement elements. On the other hand, the killer and achiever types did not like the gifting and team elements and the explorer did not like the team element.

In the design of a gamified learning environment one or more elements are used to trigger certain mechanics. The elements of points, achievements, badges, gifting, and levels were understood by different player types to trigger different mechanics. The point element was thought to trigger the competition mechanic for the killer

type and the progression mechanic for the achiever. The achievements element was considered a reward by the explorer while the achiever interpreted it as resource acquisition and the socializer as part of the narrative. The badge element was a reward for the explorer but an element serving the narrative for the socializer. Additionally, for the killer type, gifting was a negative element triggering competition as it could allow other players to move ahead of them on the leaderboard, while conversely it attracted the socializer as a method to trigger transaction. The level element served as a status mechanic for the killer but a progression mechanic for the achiever and explorer. The mechanics that the elements serve differ by player type. In other words, an element might serve different mechanics depending on player types. This is thought to be related directly to the use of elements in the design. For example, as achievements are selected to support the narrative, the achievement element triggered the socializer in this context. If the design had not been created in this manner, the achievement element would not have affected the socializer to the same degree. Such an observation reveals the importance of the way each selected element is used, in addition to its simple selection. On the other hand, elements that trigger a mechanic differed by player type. As an example, the progression mechanic was triggered by the point element for the achiever but by the level element for the explorer. Another example, the competition mechanic was triggered by the point element for the killer but by the leaderboard element for the achiever.

The mechanics and elements with a positive effect on player types are given in Figure 1. The 8 mechanics used in the design and their triggering elements according to player types were located based on Bartle's (1996) coordinate plane. Mechanics were placed onto the coordinate plane in the inner circle and the corresponding elements that served these mechanics were placed as a second, external ring. The elements that trigger player types are shown on the coordinate plane with arcs.

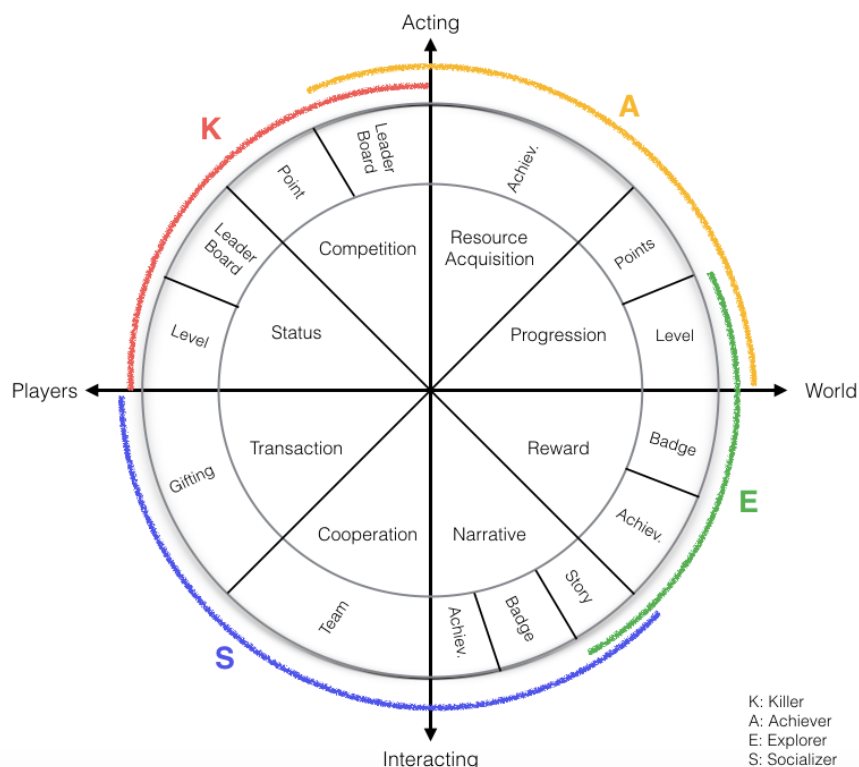


Figure 1. The elements and mechanics that positively affect different player types

Although only users with dominant player types were selected for further evaluation, player types extended into different quadrants in Bartle's original determinations (Figure 1). In Figure 1 it can be seen that, while the killer acted within the limit of its original quadrant, "acting on other players," the arcs of the achiever, explorer, and socializer extended into other quadrants. Theoretically, the achiever should be in the act-world quadrant, the explorer in the world-interact quadrant, the socializer in the player-interact, and the killer in the player-act quadrant (Bartle, 1996). Indeed, Bartle (2005) reported that individuals have primary types but might also show characteristics of different player types, depending on environment features and circumstances. In our study, these variants may be due to the way the elements were used in our gamified environment. The achiever, in addition to "acting on the world", also unexpectedly "acted with the people" through the leaderboard element. The fact that scores were given for the quality performed assignments and that players were ranked on the leaderboard might have encouraged the achiever, who aims to complete assignment as well as possible. The explorer type, who likes to "interact with the world," also seemed to enjoy "acting on the world" and was

attracted by the level element, likely related to how the progression mechanic allowed the explorer to further explore the environment. The locked levels made exploring only possible through progressing to the next level and might have triggered the explorer's desire to move forward from level to level. Another player who showed different characteristics than expected was the socializer, who crept into the explorer's quadrant and was positively affected by the narrative mechanic of the world-interact quadrant. The socializer reported that the story allowed them to feel as if they were part of the environment and that earning achievements and badge elements attracted them to the narrative.

In addition to the mechanics and elements that attracted different players, the team element was established as the one element disliked by all player types, with the exception of the socializer. While the killer believed that the team element curtailed the reputation they earned from the status mechanic, the explorer and achiever disliked this element because qualified cooperation was either difficult or impossible. The killer reported that the gifting element served as a competition mechanic while the achiever thought it negatively affected the transaction mechanic. Like the team mechanic, the transaction mechanic was only seen in a positive light by the socializer. This is thought to be caused by the way in which the gifting element, which triggers this mechanic, was used. Had the gifting element not been based solely on gifting points, this element might have attracted more players.

We found that the team element only appealed to the socializer type and can thus be an optional element in gamification design. On the other hand, cooperation is an educational goal, making the team element more important to discourage more competition. Further studies on how to balance competition and cooperation for optimal learning would be useful. In addition, clustering studies that focus on player type and gamification elements are necessary.

The current study could not explain the role of the narrative mechanic in attracting the socializer player type. Further studies on the effect of the narrative mechanic and its role relative to the other mechanics would contribute to the understanding of this mechanic's attraction. Considering its nature, instead of being a mechanic, narrative might be considered a framework. In addition, further studies on how to design a narrative that can motivate all player types in a gamified learning environment may be recommended. Finally, due to the limited number of participants, conducting additional studies with a greater number of participants to allow for generalization is warranted.

In conclusion, the current study is thought to provide further clarity about the relationship between mechanics and elements for the different player types. The findings of this study can be summarized in 5 main points:

- Players may show characteristics different from their player type depending on the design features of the gamified learning environment.
- The mechanics that attract learners in a gamified learning environment differ depending on the player type.
- The elements that trigger a mechanic might differ depending on the player types.
- An element might serve different mechanics depending on player types.
- The selection of elements and the context they are used in the design affects the mechanic they serve and therefore the entire process.

The ability of a gamified learning environment to attract all player types is directly related to the way the elements are used in the design. For this reason, learning environments should be designed to incorporate a variety of elements so that each player type is able to encounter those that attract them. In addition, it is recommended that designers should be careful when choosing elements because those viewed as neutral do not increase participation and those that are disliked negatively affect mechanics and participation. In particular, the team and gifting elements negatively affected some player types and might be made optional.

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