

The quest for a better tailoring of gameful design: An analysis of player type preferences

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ABSTRACT

Gameful systems are often developed using "one size fits all" approaches. However, it would be better to tailor the experience according to each participant's personal preferences. On that regard, player types and game design elements are the main personalization dimensions that have been studied in the literature, even though such studies often lack empirical validation, employing very small or local samples. This paper presents the results of an exploratory study that further investigates user types and preferences for different game design elements. Results show the relationships between gender and age among and between player types as well as how different game design elements influence the participants.

CCS CONCEPTS

• **Human-centered computing** → **Interaction design**; *Empirical studies in HCI*; • **Applied computing** → Computer games.

KEYWORDS

Gamification, Gameful Design, Personalization, Hexad, Player types.

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1 INTRODUCTION

Research on the field of 'gamification' or 'gameful design', understood as the use of game design principles in non-leisure environments [5], is receiving significant attention in Human-Computer Interaction (HCI) since it addresses the need to engage users through

technology. One topic of special importance during the design process is the tailoring of such systems to each user, as personalized interactive systems are more effective than one-size-fits-all approaches. This requires the dynamic adaptation to the user's behaviours in response to any situation, catering to the different users' characteristics [22].

Thus, early long-term studies undertaken to investigate this topic [2, 10] support the idea that, in order to create true behaviour change, the entire gameful system should be designed to meet the motivations of each individual user. Therefore, some basic elements must be taken into account before designing a tailored experience, such as defining the user profiles, the content and functionality, and the interface elements [9]. From there, other researchers have further conducted studies regarding a diverse set of dimensions for personalization, such as personality, gender, persuadability, as well as user types and design elements. Nevertheless, the way to make gameful interactions highly personalized, and which factors can be used to do this, are still largely unexplored.

There is still an open research niche regarding relationships between users, their specific preferences when interacting with gameful environments, and the specific game design elements to be used. Following this line of research, and in order to help deepen the experience on personalized gameful design, this paper presents the results from a preliminary study collating information on the personalization of different game design elements according to user preferences. The goal was to explore the different types of interaction with gameful digital applications, based on the Hexad User Types framework [18].

On that regard, the following research questions were set:

RQ1: What are the demographics based on their user types?

RQ2: How are participants' preferences for different game design elements affected by their user types?

This study aims to go beyond mere user interactions, trying to understand user *preferences*. The interest is not only in understanding the generic behavioural patterns of users when in an application, but particularly in how users are distinctively motivated by each design element. The analysis will benefit designers and practitioners by assisting them in developing their designs for a more effective engagement.

This paper is structured as follows. First, some general background on user types and personalization is presented in Section 2, then an analysis on personalization of the chosen game elements for

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this study is elaborated in Section 3. The study design and methods used in described in Section 4, whereas the analysis of results is presented in Section 5. Discussion is developed in 6. Section 7 closes the paper with some conclusions and some insights on possible future work.

2 BACKGROUND

When studying the process of tailoring or personalizing in the context of gameful design, *gamification persona* [24] is a very useful term, referring to data collected and analyzed about the users' goals and motivation, instead of a desired product of service. Mainly, it encapsulates detailed information about users' personality types and emotional states. On that regard, studying user personality is deemed necessary to understand what motivates of users of interactive technologies, the way in which users interact with the system or how they can be segmented according to their behaviour [15].

From a games user research viewpoint, and in terms of player modelling for personalization, approaches that keep the design process away from the individuality of each user are preferred, in the format of *player typologies*: the way in which players play or how they can be segmented according to their behaviour. The most well known taxonomy in the game design literature would be Bartle's Player Types [3]. Nevertheless, further studies on more generic terms have reached a similar correlation, such as [11, 19], Yee [33] and Nacke [20].

It is noteworthy that these models have been developed, and consequently best fitted, for pure game design, where entertainment is the sole goal of the experience. This is different from gameful design, where the goal is to motivate the users under a non-leisure context. Therefore, player type characterizations in gameful design must be explored with this characteristic in mind. A widely accepted and popular approach that fits this is the Gamification Hexad User Types framework [18], which maps user preferences towards different motivations in non-leisure contexts. This framework was validated by Tondello et al. [30], presenting a standard scale to score users' preferences. Their findings demonstrated the usefulness of the Hexad User Types model as a measure of preferred design elements.

Thus, this model is based on six user types that can be briefly described as follows:

- *Socializers* (S): Motivated by relatedness. They want to interact with others and create social connections.
- *Free Spirits* (FS): Motivated by autonomy and self-expression. They want to create and explore.
- *Achievers* (A): Motivated by mastery. They are looking to learn new things and improve themselves. They want challenges to overcome.
- *Philanthropists* (Ph): Motivated by purpose and meaning. They are altruistic, enjoying when giving to other people and enriching the lives of others in some way with no expectation of reward.
- *Players* (Pl): Motivated by rewards. They will do what is needed to collect rewards from a system.

- *Disruptors* (Di): Motivated by change. They want to disrupt the system, either directly or through other users, to force change that suits their interests.

In addition to this work, there are a few other noteworthy studies in the literature on personalized gameful design from the perspective of player types and game design elements. For example, Ferro et al. [7] studied the relationship between player types and personality traits in gameful systems, aiming to identify potential relationships with game design elements. However, their theoretical model has not been empirically validated. Likewise, Xu [32] proposes a list of game mechanics that link to different player types, based on Bartle's model. In another study, Gil et al. [8] suggest that certain game design elements can motivate some users but may be irrelevant or even off-putting for others. Apart from the limitations and size of the samples used of the cited studies, it seems there are no relevant exploratory studies in the literature on gameful design about the motivational effect of different ways of implementing game elements.

3 PERSONALIZED GAME DESIGN ELEMENTS

In order to better understand how to instantiate them for personalization purposes, it is necessary to study the core game design elements, as described by diverse authors in game [28, 34] and non-game contexts [4, 18]. Given the many game elements available, this exploratory study focuses only on a small subset among those proposed in the Hexad model, the ones with a most significant correlation with some of the its user types. The selected elements are the the following (with its corresponding Hexad player type between parenthesis): Leaderboards (Players), Teams (Socialisers), Challenges (Achievers), Voting mechanism (Disruptors), Gifting (Philanthropists) and Exploration (Free Spirits). This section provides a brief overview of each game element.

3.1 Leaderboards

Leaderboards compare the players' competence between them, and are usually associated to Player types. There are many minor design decisions involved in the tailoring of leaderboards that may influence their impact. Some interesting examples can be found in Dominguez et al. [6], where "achievements" are used instead of points in leaderboards, or Sun et al. [29], which hides the score from participants, only able to view the points interval with the next highest ranked player.

3.2 Teams

Teams require close collaboration among a group of players, and thus are usually associated with Socialiser types. There are several interesting experiences on personalizing teamwork. Team membership may be static or dynamic for the whole experience, and the players themselves may play different roles on regard to choosing to which team they belong to (e.g auto-assigned [17]). Once the team is assembled, it can be used as a pure cooperative activity [31] or a competitive one, against other teams.

3.3 Challenges

Overcoming challenges means proving oneself, and therefore, an attractive prospect for Achiever types. It is possible to provide users

with a better sense of autonomy by allowing them to choose which challenges to pursue [1], or to impose some constraint, such as a time limit, as described by Zichermann and Linden [35].

3.4 Voting mechanisms

Voting allows directly influencing the system, becoming game element coveted by Disruptor types. On personalization, Hardas and Purvis [12] proposed four types: one-to-one, one-to-many, many-to-one, and many-to-many, from the most restrictive approach to the most permissive. Robson et al. [27] describe both positive and negative votes while spectators can vote again and again.

3.5 Gifting

Gifting provides the means to directly support other users, providing a purpose to Philanthropist types. It may take the form of virtual transferable currency, such as Zichermann's *Karma* [35] or player's own points and badges, that can be given away to others [8]. Gifts themselves can be personalized taking into consideration the recipient's tastes, just or sent as a one-size-fits-all gift. Or they can be further personalized by including a message from the sender [16].

3.6 Exploration

Free Spirits are the main player type motivated by exploration, the chance to discover new things at their own pace. On that regard, Nicholson [21], proposes using a light reward-based layer as the tutorial for explorations. Sometimes exploration is its own reward, and sometimes it provides a tangible one. In addition, Ostberg and Wagner [23] suggest that tasks issued by the exploratory tutorial should increase in difficulty, but should never ask too much of the user.

4 STUDY METHODOLOGY

The study was executed under the following principles. First, the findings should be obtained through empirical evidence, as a result of a process of analysis, neither based on assumptions nor the prior experience of researchers. Secondly, we considered how to reach the widest sample necessary for this kind of study, to provide relevant conclusions. Finally, it was necessary to consider how to go further than previous works (see Section 2).

4.1 Survey Design and Execution

In order to answer the proposed research questions, the survey was carried out, with the involvement of various actors, following the phases described below:

- (1) **Review:** An initial review was conducted, focusing on gamification studies that address the connection between user types and game design elements, leading to a selection of game design elements that would be the basis of the study.
- (2) **Design:** A preliminary draft of different ways of instantiating each of the selected game design elements, from a personalization perspectives, was designed (subsequently referred to as "statements"). Initially, it consisted of a total of 87 statements.
- (3) **Expert Selection:** A group of experts in Human-Computer Interaction (HCI) and games user research was selected,

with a demonstrable expertise in the field and knowledge of the Hexad model. The recruitment process was carried out through personalized invitations sent by e-mail and a total of eight experts voluntarily joined the focus group.

- (4) **Statement validation:** A filtering process was conducted on the initial statements, by means of feedback from the selected experts, resulting in a list of the six top-rated statements for each game design element (for a total of 30, see Table 1).
- (5) **Ethics committee approval:** The survey was developed submitted for clearance and approval from the ethics committees of the three institutions involved in this work: Ethics Committee of Universitat Oberta de Catalunya, Office of Research Ethics of University of Waterloo, and Ethics Committee on Research and Animal Welfare of University of La Laguna.
- (6) **Translation:** Two independent native speakers translated separately all the statements and descriptions in the survey from the original language, to those of other additional targets. Finally, each translated version was compared and discussed by an independent third native speaker.
- (7) **Pilot test:** A pilot survey was executed with a small sample of participants, which purposely excluded researchers and experts in the field. Its purpose was an early identification of syntax or translation errors, as well as statements that participants found ambiguous or easy to misunderstand. From this feedback, the final survey was created.
- (8) **Activation and Dissemination:** The final survey was enabled for a total of 61 days. A media campaign was conducted by means of mailing lists, social networks, specific forums, and related events, in order to invite as many participants as possible.

4.2 Survey participation

Great effort was put into getting as wide and representative a sample as possible. To this end, participants were mainly recruited through snowball sampling with the use of e-mails (in both academic and non-academic environments). The recruitment process was conducted without offering a direct remuneration, commonly used in studies via crowdsourcing platforms that provide micro payments per answer. However, all participants were invited to enter a draw for two 50 Euro virtual gift cards (or equivalent in another currency), by providing a valid e-mail address for this single purpose.

The total number of participants who answered the survey was 925. The filtering process ensued, summarized in Figure 1, discarding different sets of participants for several reasons to ensure the quality of our sample.

- 240 participants that only partially completed the survey. Of these, 95 did not report any information, 74 just provided demographic information, and 71 only answered questions regarding general preferences.
- 50 participants that completed the survey in less than 5 minutes, the minimum dedication time (at least an average of 5 seconds per question) considered necessary to understand the questions correctly and respond in a non-random way.

Table 1: Statements analyzed per game design element

| | ID | Statement | Expected Player Type |
|--------------|-----|-----------------------------------------------------------------------------------------|----------------------|
| Leaderboards | S1 | I like leaderboards that are regularly reset so newcomers will not be at a disadvantage | Player |
| | S2 | I like when leaderboards highlight each users' status | Player |
| | S3 | I like leaderboards that only display users from my peer group and friends | Player |
| | S4 | I like disrupting the leaderboard by lowering the cores of others | Player |
| | S5 | I like leaderboards in which I can transfer points to others to help them climb up | Player |
| Teams | S6 | I like the freedom to join and leave a team whenever I wish | Socializer |
| | S7 | I like teams that have minimal requirements to join them | Socializer |
| | S8 | I like teams in which members depend on one another, one for all, all for one | Socializer |
| | S9 | I like to make comparisons between different teams (e.g., stats) | Socializer |
| | S10 | I like teams without pre-established rules | Socializer |
| Challenges | S11 | I like challenges with multiple paths for success | Achiever |
| | S12 | I like challenges where I know I will be rewarded for overcoming them | Achiever |
| | S13 | I like to create challenges for other people | Achiever |
| | S14 | I like challenges that must be completed in teams | Achiever |
| | S15 | I like helping others to overcome their challenges | Achiever |
| Voting | S16 | I like always voting for positive consequences for others | Disruptor |
| | S17 | I like it when my voting effort is rewarded | Disruptor |
| | S18 | I like it when it is required to have a certain status to vote | Disruptor |
| | S19 | I like to know how other people voted before I vote | Disruptor |
| | S20 | I like to have the freedom to choose a positive, blank, or negative vote | Disruptor |
| Gifting | S21 | I like anonymous gifting | Philanthropist |
| | S22 | I like to customize my gifts | Philanthropist |
| | S23 | I like to know how much others value my gifts | Philanthropist |
| | S24 | I like it when gifting is not restricted to objects (e.g. - invitations or- access) | Philanthropist |
| | S25 | I like it when gifting is considered valuable | Philanthropist |
| Exploration | S26 | I like it when exploring provides additional advantages for me | Free Spirit |
| | S27 | I like it when exploration is required for the user progress | Free Spirit |
| | S28 | I like to be able to influence others ability to explore | Free Spirit |
| | S29 | I like it when exploring facilitates social connections | Free Spirit |
| | S30 | I like when my feedback or advice can help other users explore | Free Spirit |

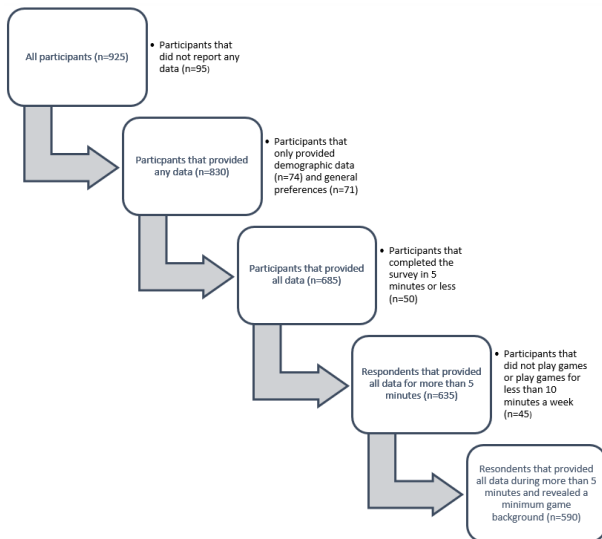


Figure 1: Sample's filtering process

- 45 participants who specified that in a typical week they played games for less than 10 minutes, to prevent a possible lack of understanding of the survey statements.

This procedure discarded a total of 335 respondents (36.2%) from the initial sample, retaining a final sample of 590 participants. Despite adding up to more than a third of the initial participants, a considerable reduction, this step was considered to be vital in assuring the reliability and validity of the study.

4.3 Procedure

The survey was deployed in an online service, using the LimeSurvey software. This allowed us to conduct a large-scale online survey translated into four languages, collecting data from a wide range of participants all over the world. Great care was put in ensuring the equivalence and validity of the statements used between languages during the Translation Phase. Participants were asked to complete a 15-minute survey made of questions focused on their preferences while using gameful systems within digital applications. By default, the survey could be completed anonymously and allowed participants to skip any of the questions. At any time during the process, participants could check their progress within the survey and abandon it with no explanation necessary, if desired.

The survey had a total of 67 questions, grouped into five sections as follows.

- Four questions about demographics (age, gender, country, and native language), with the purpose of describing the sample and analyzing its validity and representativeness.

- Two questions about gaming habits, aimed at assuring respondents had a minimal background in the field of the present study.
- Twenty four questions (7-point Likert scale) about interactions with gameful digital applications from the Gamification User Types Hexad Scale [30], in order to segment users according to their preferences.
- Six open questions regarding examples of games which implement the game design elements, in order to measure the respondents' knowledge about the elements on which the sentences were based.
- Thirty questions (7-point Likert scale) regarding experience and enjoyment of different ways of implementing the selected game design elements, to measure their relevance to different configurations of game design elements.
- Finally, one optional question inviting respondents to join a draw of two rewards (contact e-mail), as a compensation for their time answering the survey.

5 STUDY RESULTS AND ANALYSIS

In this section, the survey results and consequent statistical analysis is presented, in order to answer the RQ1 and RQ2 proposed in Section 1. The analytic studies described were conducted using the R tool (version 3.2.2) [26], a free software environment for statistical computing.

5.1 Demographics

The distribution of the final sample of 590 participants, considering gender and age, is presented in Tables 2 and 3, respectively. From a general point of view, the sample was composed of slightly more males (58.31%). Participants' ages ranged from 18 to 65 years old, where the mean was 31.40. On regards to the origin of participants, the cultural representation of the sample was high, obtaining answers from participants of 47 different countries from six continents.

Table 2: Gender distribution.

| Gender | Total | Perc. (%) |
|---------------|-------|-----------|
| Male | 344 | 58.31 |
| Female | 238 | 40.34 |
| Other | 6 | 1.02 |
| Missing value | 2 | 0.34 |

Table 3: Age distribution.

| Interval | Total | Perc. (%) |
|---------------|-------|-----------|
| 18–29 | 290 | 49.24 |
| 29–41 | 203 | 34.47 |
| 41–53 | 76 | 12.90 |
| 53–65 | 20 | 3.40 |
| Missing value | 1 | 0.17 |

Only 9.83% of the participants had to complete the survey in a language that was not their native language. Although English

natives represented only 16.78% of the sample, the English version of the survey was selected by 28.47% of the participants, most of them coming from countries whose official languages were not available in the survey. It is also worth mentioning that, according to the collected data, most respondents play games between one day a week (17.46%), three days (16.10%), or up to seven days a week (29.32%). Moreover, a total of 89.32% of respondents provided at least one application example of each game design element asked, which was not a mandatory section. All this data can be interpreted as evidence that most participants did not have any problem following the survey.

5.2 User experience and preferences

User preferences were assessed using the Gamification User Types Hexad Scale, a validated survey about interactions with gameful digital applications. Based on the answers, scores were obtained for each user type per participant. Next, respondents were represented as a *label*, based on their user type in which they had the highest score. Whenever there was a tie (i.e., the user presented the same score in the highest values), the number of participants assigned to each type was incremented in 1.0, then divided by the number of types involved (e.g., 1.0 if only one type had the maximum score, 0.5 if two types had the maximum score, 0.33 if there were three, etc.). Figure 2 shows the comparative frequency of each user type in the study sample.

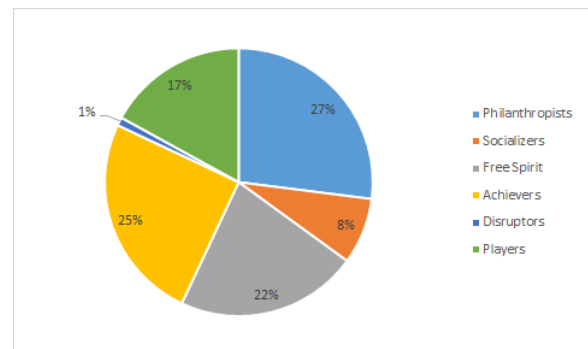


Figure 2: Distribution of the Hexad user types (N = 590).

Regarding demographics, Figures 3 and 4 show the distribution of user types by gender and age. There seems to be a higher percentage of Philanthropists among females, whereas there seems to be more Socialisers, Free Spirits and Players among males. However, Pearson's chi-squared test for independence did not reveal a significant association between user types and gender: $\chi^2(5) = 8.45, p = 0.133$. Regarding age, it seems that the older the participant, the less their likelihood of being Achievers or Players, and the higher their chances of being Socialisers, Philanthropists and Free Spirits. The tendency is clear but results from the interval of 53–65 years old probably should not be considered, due to the reduced sample size (N=20). Additionally, the chi-squared test did not reveal a significant association between the user type and age: $\chi^2(15) = 17.30, p = 0.301$.

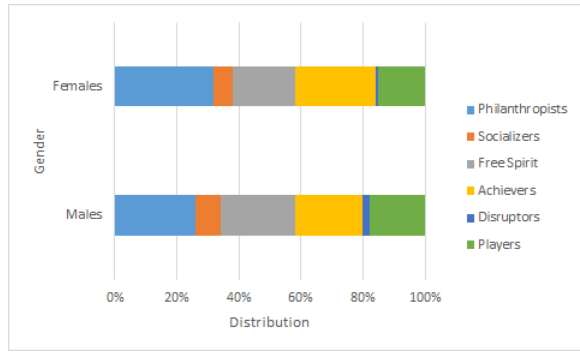


Figure 3: Distributions of user types by gender (N=590).

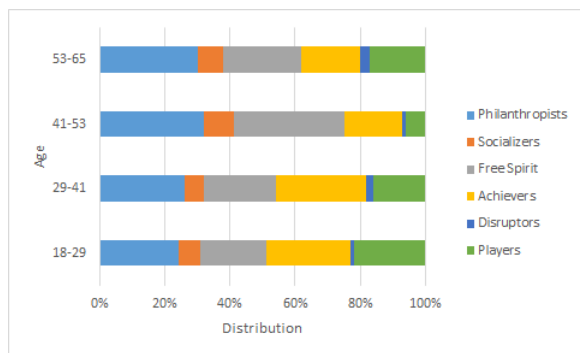


Figure 4: Distributions of user types by age (N=589, 1 missing value).

5.3 Preferences on personalization elements

Given a participant’s main player type (or types) and the responses obtained for each of the statements (see Table 1) on regards to personalization of each of the chosen game mechanics, it is possible to analyze how preferences for different game design elements are affected by their user types. Table 4 summarizes the Kendall rank correlation coefficients between statement (Stat) and participant scores for Hexad player type (Phi = Philanthropist, Soc = Socializer, FrS = Free Spirit, Ach = Achiever, Dis = Disruptor, Pla = Player). Even though the values were calculated for all combinations, for better readability, only rows showing any of the 15 cases where a relevant effect ($\tau \geq 0.20$, in bold) was observed are included in this paper.

6 DISCUSSION

Once the data analysis has been conducted, it is possible to attempt providing an answer to the research questions RQ1 and RQ2. However, first it is imperative to comment on limitations of the sample representativeness. On that regard, the size of the study cohort was large (N = 590) and not limited to students. This is in contrast to other published studies in this field (e.g., [8, 14, 30]); however it cannot be considered to be representative at a worldwide scale, due to the limited amount of 47 countries represented.

Table 4: Kendall rank correlation coefficients between user statements and type scores regarding design elements (cases with relevant effect).

| Stat | Phi | Soc | FrS | Ach | Dis | Pla |
|------|--------------|--------------|-------------|--------------|-------|--------------|
| S2 | 0.06 | 0.12 | 0.07 | 0.10' | 0.11 | 0.27' |
| S4 | -0.10 | -0.02 | 0.01 | -0.03 | 0.08' | 0.20' |
| S8 | 0.22' | 0.22' | 0.12 | 0.12 | 0.03 | 0.02 |
| S12 | 0.06 | 0.08 | 0.11 | 0.08' | 0.04 | 0.34' |
| S13 | 0.21 | 0.18 | 0.18 | 0.13' | 0.14' | 0.12 |
| S14 | 0.16 | 0.29' | 0.13 | 0.15' | 0.02 | 0.08 |
| S15 | 0.39' | 0.26 | 0.24 | 0.21' | 0.05 | -0.02 |
| S17 | 0.04 | 0.08 | 0.08 | 0.05 | 0.06' | 0.32' |
| S20 | 0.12 | 0.10 | 0.15' | 0.20 | 0.00' | 0.13 |
| S23 | 0.09' | 0.11' | 0.05 | 0.04 | -0.03 | 0.21 |
| S29 | 0.16 | 0.28' | 0.12' | 0.07 | 0.02 | 0.14 |

6.1 User types demographics

To answer RQ1: “What are the user demographics based on their user types?”, an in-depth demographic analysis of the sample, regarding the Hexad user types, was conducted.

Analysing the association between user types and gender, Philanthropists and Achiever females were more common than these user types among the cohort’s males; Players and Free Spirits were more common among males. There was less of a differential between our results and those of Tondello et al. among Socialisers and Disruptors (7% and 1% versus 9% and 1%). These results seem to fit with the findings of Hartmann and Klimmt [13]; they observed that men were more likely than women to play highly competitive games, and that they do not enjoy helping others so much, but are motivated rather by earning rewards, competing, and feeling autonomous. Nevertheless, it is important to note that the chi-squared test did not reveal this gender difference regarding the Hexad user types to be statistically significant.

Regarding age, Philanthropists, Socialisers, and Free Spirits were more prevalent among people aged 41–53, Achievers among people aged 29–41, Disruptors among people aged 53–65, and Players among younger people aged 18–29. The youngest respondents seem to be more interested in competition and earning rewards. These results also seem to fit with a study conducted by Quantic Foundry [25], showing that interest in competition decreases over the years. This study also found that older respondents preferred in greater proportion being given the opportunity to disrupt the system. These results also suggest that age can influence the distribution of the user types in a wide sample; however, the chi-squared test showed that this difference was not statistically significant in our sample.

6.2 Game design elements preferences

To answer RQ2: “How are participants’ preferences for different game design elements affected by their user types?”, the relevant correlations according to their impressions on the statement in Table 1 was analyzed. A summary with the most relevant results is shown in Table 4, focusing on whether the proposed statements of each game design element correlated with the expected user types (based on prior literature).

A weak correlation was found between Philanthropists, teams and exploration, a moderate correlation between them and a positive attitude towards challenges, and no correlation was found with gifting. It is not quite surprising that being Philanthropists as relevant in terms of the frequency of participants in the sample, the expected element related to them (gifting) is relatively less valued (or, at least, it is not identified) by participants. Regarding Socialisers, a weak correlation was found with teams, as expected; however, a weak correlation was also found with challenges and exploration. Free Spirits presented a weak correlation with challenges, as expected too. Moreover, Achievers present moderate correlations with challenges and a weaker correlation with voting. The Disruptor user type did not correlate with the suggested game design elements voting or challenges, which differs from the results reported by Tondello et al. [30]. Finally, Players presented the highest number of correlations: weak correlations were observed with leaderboards, challenges, voting, and gifting. It is also noteworthy that challenges were present in correlations with all user types except Disruptor; in contrast, gifting and leaderboards were correlated with only one user type, Players.

These results support the assumption that participants' preferences for different game design elements are affected by their user types. In general terms, the results suggest that challenges constitute an element expected or desired by almost any user type, and should be taken into account in any attempt at gameful design. Leaderboards are preferred by Players; teams should be considered specially for Philanthropists and Socialisers; voting mechanisms are enjoyed by Players and Achievers; Gifting should be used to motivate Players; and Exploration is better rated by Socialisers and Philanthropists. This is valuable information for game designers who want to tailor gameful systems to specific user types: after finding out a user's type scores, individual gameful elements can be prioritized (highlighted) or not (hidden) in a gameful system to increase the likeliness or affording optimal engagement.

7 CONCLUSION

This paper explores the possibilities for personalized gameful design based on preferences of different user types when interacting with gameful digital applications through diverse game design elements. Although the key goal of obtaining a large enough sample for an exploratory purpose was achieved, it is important to take into consideration that most of the participants were young people, perhaps due to the dissemination of the survey in higher education environments. Also, the survey was limited to adults of legal age, so no children are not included in the sample data.

The results reveal different preferences for the studied game design elements. The data showed that the different ways the same game element is designed and implemented can affect the user's enjoyment, depending of their user type scores. This work contributes to HCI research by providing some pointers to new hypotheses regarding personalized gameful design, which can be further studied and potentially validated in future work. This opens new possibilities for studying the relationships between game design elements, user types, and context (as a new variable that may have an effect) in personalized gameful systems.

Future work should explore more thoroughly different perspectives of measuring user types, from the current coarse-grained (generic user types) to a fine-grained considering combination of them (hybrid user types) and how motivation is affected by the game design elements tailoring to particular user types and applied in different non-game environments (education, health, human resources, etc.). The aim is to investigate whether varying the application domain also has any influence on a user's perception and enjoyment of the different game design elements and instantiations.

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