Player Types and Game Element Preferences: Investigating the Relationship with the Gamification User Types HEXAD Scale

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Abstract. Gamification has gained scientific attention as a motivational tool for behavior change in various contexts. When designing gamification, several scholars emphasize the importance of tailoring content to the needs of different users, e.g. by using the gamification user types HEXAD typology. From a theoretical point of view, researchers suggest correlations between HEXAD types and certain game elements, but empirical validation of these assumptions is still lacking. Previous studies show limitations either in terms of sample size or comprehensiveness of analysis. Therefore, this study aims to empirically identify game element preferences of different HEXAD types and to validate both the English and a corresponding German version of the HEXAD scale in a quantitative study design with 1,073 participants. The validation shows that the HEXAD scale is a valuable tool for identifying HEXAD types, with some improvements needed for a better model fit. Correlation analysis shows highly significant correlations between HEXAD types and specific game elements. While Philanthropists are motivated by gifting, administrative roles, and knowledge sharing, Free Spirits prefer creativity tools, exploratory tasks, and learning. Both Achievers and Players like challenges, leaderboards, levels, and competition, but Players are additionally attracted by extrinsic elements such as achievements, points, and rewards. Socializers like social elements, i.e., teams, social discovery, and social networks. Finally, Disruptors like anarchic gameplay and innovation platforms. In general, the results suggest that the HEXAD typology provides helpful and validated guidance for tailored gamification, and our findings should successfully drive future gamification design to maximize the desired behavioral outcome.

Keywords: Gamification · HEXAD · Player types · User types · Gamification design · Game elements · Tailored gamification

1 Introduction

Gamification – the use of game design elements in a non-game context [1] – has gained scientific attention as a motivational tool for behavioral change in various application contexts [2–6]. While results of gamification are predominantly positive [2, 5–9], some mixed results have also been reported in terms of motivation, engagement, and learning

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outcomes [10–12]. Thus, gamification does not appear to be effective per se [13]. Instead, several scientists emphasize the importance of tailoring content to the needs and motivations of different users [14–18] to achieve the desired results. In this context, player typologies from gaming research, such as Bartle's player types [19] and Yee's five motivations to play MMORPGs [20], have been used to identify different types of users and their game element preferences and thus to enable tailoring gamification to their specific needs [21]. However, they exhibit difficulties to be applied in the non-game context of gamification [22–24]. To address this issue, the gamification user types HEXAD typology [25] has been developed explicitly for gamification and is now one of the most widely used personalization typologies [21, 26].

Nevertheless, providing a typology alone is not sufficient for successful gamification design in terms of personalization. To best achieve the intended behavioral outcome of gamification, researchers and practitioners need reliable recommendations on *how* to personalize their intervention for different user types [27], i.e. which game elements to select for meeting the needs of a specific user type. From a theoretical perspective, scientists [21, 25] hypothesize relationships between HEXAD types and preference for specific game elements, but empirical validation of these assumptions is still lacking. Previous studies provide valuable starting points, but show limitations either in terms of sample size [24, 28] or comprehensiveness of the analysis since only a limited set of game elements [29] or more general persuasive strategies [30] are investigated.

Therefore, a comprehensive validation and extension of these preliminary results with larger and more diverse samples are essential to derive reliable suggestions for tailored gamification design [23]. To fill this gap, this study aims to identify the game element preferences of different HEXAD types with a large sample to assist in tailored gamification design emphasized by many scholars. Moreover, we attempt to validate both the English version [23] and a corresponding German version of the HEXAD scale. Our results confirm that the HEXAD scale [23] is a valuable tool for the identification of HEXAD types, with some improvements needed for a better model fit. Moreover, we identify highly significant correlations between HEXAD types and preference for specific game elements.

2 Related Work

In the following section, we introduce the concept of gamification and discuss previous research on tailored gamification design. Furthermore, we describe the gamification user types HEXAD scale and existing studies on the relationship between HEXAD types and game element preferences as a basis for our work.

2.1 Gamification

While a game refers to structured play with rules and goals for entertainment [31], gamification is characterized by a serious purpose. *Gamification* can be defined as *the use of game elements in non-game contexts* [1]. A particular emphasis is placed on game *elements*, which include e.g. levels, points, badges, or leaderboards [24, 32], and

distinguish gamification from *serious games*. While both share a serious purpose, serious games are full-fledged games with a virtual environment [1] and thus closer to the concept of a game than gamification.

Since the emergence of the research field in the 2010s [1, 3], gamification has been used to transfer the positive effects of games, such as motivation and engagement [33], to various contexts, e.g. education [7, 32, 34], healthcare [35, 36], business [37–39] or sustainability [40, 41]. However, even though the majority of empirical studies report positive effects of gamification [2, 5–9], the results are not unanimously positive [2, 11]. For example, some works report no effects on intrinsic motivation [10, 12], behavioral learning outcomes [11], or engagement with the system [42], which indicates that gamification may not be effective per se [13]. For instance, the success of gamification particularly depends on the design elements and principles selected [42]. In this context, an important principle emphasized by many scholars [14–18, 43–45] is to personalize the content and mechanics of the gamified system to the individual needs and motivations of the user – also referred to as tailored gamification design [21].

2.2 Tailored Gamification Design

Tailored gamification design corresponds to concepts such as personalization and adaption [21] and describes the alteration of aspects of the gamified system with the most appropriate solution to fulfill the specific needs of the user [46]. Since users' needs, personalities, and motivations influence the expected benefits [47, 48] and actual performance [49] in gamified systems, gamification designers in both academia and practice need to be supported with knowledge on *how* to design tailored gamification [27].

In this regard, a variety of typologies have been proposed that classify players based on their needs, characteristics, and motivations [21, 50, 51]. Although they differ in their labels and number of types, several typologies share common concepts of various strengths expressed in different player types, such as achievement, exploration, sociability, domination, and immersion [50]. Among those, Bartle's player types [19], the BrainHex archetypes [52], and Yee's five motivations to play MMORPGs [20] are most commonly used to design tailored gamification [21, 26].

However, the application of player typologies from game research in the serious context of gamification has been criticized [22, 23], as users might experience game elements embedded in applications differently in a non-game context than in games [24]. To address this criticism, the gamification user types HEXAD typology [25] has been developed explicitly for the context of gamification. Based on *four drives theory* [53] and especially *self-determination theory* [54], which is the most widely used motivation theory in gamification research [3], Marczewski distinguishes between six user types: *Philanthropists*, *Disruptors*, *Free Spirits*, *Achievers*, *Players,* and *Socializers* [25]. *Philanthropists* are motivated by purpose and are considered altruistic, while *Socializers* are motivated by relatedness and primarily want to interact with others [23]. *Achievers* and *Players* are both strive to improve themselves, but Achievers are primarily motivated by competence, while Players seek extrinsic rewards [23]. *Free Spirits* usually prefer autonomy and freedom to create and explore [23]. Finally, *Disruptors* are motivated by change and tend to test the boundaries of the system [23].

In gamification research, the gamification user types HEXAD have gained popularity as a basis to design tailored gamification [21, 26], e.g. for personalizing energy-saving recommendations [55], deciding on features in a game-based learning system [56], or selecting game design patterns and mechanics for a rehabilitation game [57].

2.3 The Gamification User Types HEXAD Scale

To identify and measure the gamification user types HEXAD, the research group around Marczewski, in particular, Gustavo Tondello [23, 28, 58], systematically constructed and refined an appropriate questionnaire for the six HEXAD types. The final scale was validated in English and Spanish and consists of four items for each of the six HEXAD types [23].

From a theoretical point of view, both Marczewski himself [25] and other scholars [21] hypothesize relationships between HEXAD types and preference for certain game elements. Initial studies have attempted to empirically investigate the suspected relations. Tondello et al. surveyed 133 students at the University of Waterloo, Canada about their HEXAD types and game element preferences and found significant correlations for all HEXAD types except Philanthropist [28], e.g., Socializers preferred teams, social networks, and social competition, while Achievers were attracted by challenges, certificates, badges, and levels. Broadening the focus, they used a similar study design with a sample of 188 respondents through an online survey and aggregated the individual game elements into components [24], similar to those proposed by Hamari and Tuunanen [50], identifying significant correlations between HEXAD types and game element components, e.g. socialization elements were preferred by Socializers, risk/reward elements were mostly related to Achievers and Players and altruism elements were strongly preferred by Philanthropists. In addition, a larger study by the same research group examined the relationships between HEXAD types and six selected game elements (leaderboards, teams, challenges, voting, gifting, and exploration) with a sample of 925 participants [29] and confirmed suspected correlations between teams and the Socializer type, exploration, and the Free Spirit type, and challenges and the Achiever type, but similar to [28], failed to identify a significant relationship between gifting and the Philanthropist type. Also, the research group investigated the correlation between HEXAD types and ten persuasive strategies with a sample of 543 respondents [30] and found that e.g. Socializers were attracted to all persuasive strategies, while Players mostly liked competition and reward.

However, except for the first study, these previous studies did not explore the relationship between HEXAD types and the wide variety of individual game elements. Aggregating the game elements into components and persuasive strategies or considering only a limited set of six game elements, prevents researchers and practitioners from directly and efficiently determining which game elements to select for each user type in order to design successful tailored gamification. Although the first study provides valuable insights in this regard, its sample size of 133 students is insufficient to derive reliable recommendations for tailored gamification design. The research group around Tondello et al. therefore explicitly calls for a comprehensive validation and extension of these preliminary results with larger and more diverse samples, which are imperative to derive reliable suggestions for tailored gamification design [23].

3 Method

Addressing this gap, this work aims to *validate both the English version* [23] *and a corresponding German version of the HEXAD scale* and *to identify the game element preferences of different HEXAD types*. To meet these research objectives, we employ a quantitative study design based on the questionnaires used in prior studies [23, 28]. For scale validation, we use a scale reliability analysis, an exploratory factor analysis with oblique rotation for correlating factors [59], since a partial overlap of HEXAD types is expected, and a confirmatory factor analysis. To identify the game element preferences of the different HEXAD types, we use bivariate correlation analysis.

3.1 Questionnaire and Procedure

To ensure comparability with the validation study conducted by Tondello et al. [23], we used the final validated English scale from [23]. During the original development of the HEXAD scale, a German version was also constructed [28], which was made publicly available on the Gamified UK website [60]. However, the German version of the HEXAD scale was not included in the second and third validation steps [23], so that some items of the validated scale were not yet translated into German. Furthermore, as native German speakers, we perceived the wording of some other German items as complicated and in need of grammatical improvement. Therefore, the English items of the validated English scale [23] were independently translated and back-translated [61] by three native German speakers with at least C1 English proficiency and then refined in a committee format [61] into the final, decentered scale used for this study, as documented in Table 5 (in the Appendix).

The questionnaire was designed as an online survey consisting of two parts. The first part contained the 24 items of the HEXAD scale, and the second part asked participants to rate 35 game elements, adapted from the literature analysis by Tondello et al. [24], each on a seven-point Likert scale. At the end of the survey, participants were invited to voluntarily provide demographic data, such as age, gender, and nationality. Participants were free to choose English or German in the questionnaire, depending on their language proficiency. In addition to the distribution in our network, we promoted the survey on Facebook to reach a diverse sample of participants from different continents. The survey took place in October 2020 and the participants received no compensation other than the calculation of their HEXAD type at the end of the survey.

3.2 Participants

In total, 1.075 participants answered the study, of which two were excluded during data anomaly checking. The final sample consists of 1.073 participants from 59 different countries, of which Germany (n = 380), Portugal (n = 84), Canada (n = 72), the United States (n = 43) and Italy (n = 40) account for the largest shares. The total distribution is illustrated in Table 1.

Table 1. Distribution of nationalities in the final sample.

Country	No. of participants	Percentage	Country	No. of participants	Percentage
Germany	380	35,4%	Turkey	33	3,1%
Portugal	84	7,8%	Greece	31	2,9%
Canada	72	6,7%	Belgium	21	2,0%
United States	43	4,0%	United Kingdom	17	1,6%
Italy	40	3,7%	New Zealand	14	1,3%
Spain	39	3,6%	France	13	1,2%
Australia	34	3,2%	Philippines	13	1,2%
Other (Estonia, Bangladesh, Netherlands, Poland, Norway, Bulgaria, Indonesia, Ireland, Romania, Sweden, Austria, Pakistan, Egypt, India, Myanmar, Serbia, Switzerland, Vietnam, Algeria, Bosnia and Herzegovina, Croatia, Finland, Hungary, Malaysia, Namibia, Slovakia, South Africa, Albania, Andorra, Bahrain, Bhutan, Brazil, China, Denmark, Djibouti, Ethiopia, South Korea, Libya, Malta, Mauritius, Mexico, Papua New Guinea, Russian Federation, Syria, Tunisia)				125	11,6%
Not provided				114	10,6%

The mean age is *M = 27,51, SD = 7,335*. 13,2% of the participants are 20 years old or younger, 59,5% are between 21 and 30 years old, 22,3% are between 31 and 40 years old, 4,2% are between 41 and 50 years old and 1% are 51 years old or older. 540 of the 1.073 participants are male, 340 are female, 23 identify as another gender, and 170 participants did not indicate their gender. Regarding the language chosen, 67,9% of the participants answered the survey in English, 32,1% in German.

4 Results

In the following, we first report on the analysis of the HEXAD scale in English and German, using a scale reliability analysis, an exploratory factor analysis, and a confirmatory factor analysis to ensure comparability with the validation study by Tondello et al. [23]. Second, we analyze the relationship between HEXAD types and preference for specific game elements with correlation analysis.

4.1 Validation of the HEXAD Scale in English and German

First, we checked whether the partial overlap, i.e. intercorrelation, of HEXAD types [23, 28] also applies to our analysis, which determines whether factor analysis is performed with oblique rotation or with orthogonal rotation [59]. For the correlation analysis, we used Kendall's τ_b due to the non-parametric Likert scales of the HEXAD scale.

Table 2. Bivariate correlation coefficients between the HEXAD types (** $p < .01$).

User type	Philanthropist	Socializer	Free spirit	Achiever	Player
Socializer	.365**				
Free spirit	.155**	.042			
Achiever	.213**	.158**	.310**		
Player	.062**	.126**	.127**	.259**	
Disruptor	−.02	.024	.295**	.148**	.067**

As shown in Table 2, we find partial overlap between the user types, which is overall consistent with the findings of Tondello et al. [23, 28]. Only the correlation between Socializer and Free Spirit reported in the former studies cannot be confirmed.

In general, Achiever *(M = 24,05, SD = 3,328)* and Philanthropist *(M = 23,96, SD = 3,304)* are the most dominant HEXAD types in our sample, followed by Free Spirit *(M = 22,92, SD = 3,405)*, Player *(M = 21,5, SD = 4,216)* and Socializer *(M = 21,1, SD = 5,092)*. In accordance with the results of Tondello et al. [23], Disruptor showed the lowest mean score *(M = 15,84, SD = 4,912)*.

The results of the internal scale reliability analysis (Cronbach's α) overall and for each subscale per survey language are presented in Table 3. While the Socializer, Achiever, and Philanthropist scales can be considered as reliable in English ($\alpha > 0.7$), issues arise with the Free Spirit scale, in concordance with Tondello et al. [23]. Furthermore, the Player and Disruptor scales in both languages and the Philanthropist scale in German show values below the acceptable threshold.

Table 3. Internal reliability scores for each HEXAD user type (overall and per language).

User type	α (overall)	α (English)	α (German)
Philanthropist	0,72	0,729	0,605
Socializer	0,846	0,841	0,785
Free spirit	0,659	0,652	0,678
Achiever	0,741	0,749	0,724
Player	0,650	0,638	0,682
Disruptor	0,571	0,528	0,670

Exploratory factor analysis reveals that certain items have low factor loadings and should therefore be further improved to enhance the overall reliability of the scales. To ensure comparability with previous studies [23, 28], we used the Unweighted Least Squares method for factor extraction, combined with an oblique Promax rotation due to partial overlap of factors [59] in IBM SPSS statistics 26, forcing extraction of six factors. The Kaiser-Meyer-Olkin test (KMO = .817 for the English sample and KMO = .775 for the German sample) and Bartlett's Test of Sphericity ($\chi^2 = 5013.35$,

$p < .01$ for the English sample and $\chi^2 = 2229{,}8$ $p < .01$ for the German sample) support the suitability of the data for factor analysis [62]. Table 6 (English) and Table 7 (German), located in the Appendix, show the factor loadings for each of the HEXAD survey items.

The analysis of the HEXAD scales indicates that the items F2 and P3 (both languages), F4, D1 and A1 (English), and D2 (German) cause difficulties in factor extraction and should therefore be further improved for better reliability of the scale. R3 (German) and F1 (English) also have comparatively low factor loadings, which requires refinement. However, the vast majority of the items load well on distinguishable factors, which is supportive of a general validity of the HEXAD scales.

To evaluate the fit of the HEXAD scales with the theoretical model, we conducted a confirmatory factor analysis using structural equation modeling with a maximum likelihood method in IBM SPSS Amos 26, following the method of Tondello et al. [23]. We modeled the six HEXAD types as latent variables and added the survey items as observed variables.

Overall, the Chi-Square Test ($\chi^2 = 1620.1$, $p < .01$ for the English sample and $\chi^2 = 796.72$, $p < .01$ for the German sample), the calculated RMSEA (.086 for the English sample and .079 for the German sample) and the calculated CFI (.715 for the English sample and .729 for the German sample) do not support evidence for a good model fit [63], in line with the results of Tondello et al. [23]. Table 8 (in the Appendix) shows the standardized (β) and unstandardized (B) regression weights and standard errors (SE) for both the English and German samples. Similar to the results of Tondello et al. [23], items F2 and R3 have low weights on their subscales in the English sample. Also, confirming the observations from the exploratory factor analysis, items F4 and D1 need further adjustment for a better model fit. On the German scale, F2 and R3 are similarly problematic, and additionally, P3 should be enhanced to improve the goodness of fit. In general, the majority of the items load highly on the respective subscales.

Conclusively, the validation shows that the HEXAD scale in English [23] and German is a valuable instrument for adequate identification of HEXAD types, but some improvements in both languages are needed to increase the reliability of the subscales and to achieve a better model fit.

4.2 HEXAD Types and Game Element Preferences

To assess the relationship between HEXAD types and preference for specific game elements, we perform a correlation analysis. Due to the non-parametric nature of the 7-point Likert HEXAD and game element rating scales, we used Kendall's τ_b for the analysis. Table 4 presents the correlations of HEXAD types with game elements according to suggestions in the scientific literature [21, 25], both in aggregate form and for each game element. For readability, we only show correlations with a coefficient value of at least .125. Correlations with a coefficient greater than .20 are marked in bold.

Table 4. Correlations of the HEXAD types with game elements ($\tau_b \geq .125$, ** $p < .01$).

User type	Suggested Items [21, 25]	Philanthropist	Socializer	Player	Achiever	Free spirit	Disruptor
Philanthropist	Philanthropist elements	**.222****	.174**	.173**	.160**		
	Collection			.131**			
	Gifting	.194**	.165**	.162**			
	Knowledge sharing	.174**	.148**		.154**	.142**	
	Administrative roles	.176**	.129**				
Socializer	Socializer elements		**.299****	**.253****	.199**		
	Guilds or teams	.177**	**.377****	.143**	.157**		
	Social networks		**.231****	.164**			
	Social comparison		.191**	**.223****	.190**		
	Social competition		**.291****	**.285****	**.287****		.126**
	Social discovery		**.200****	.167**	.128**		
	Tips		.131**	.139**			
	Social status		.159**	**.227****	.144**		
Player	Player elements			**.367****	.172**		
	Points			**.281****	.180**	.146**	
	Rewards or prizes			**.366****	.161**		
	Leaderboards		.166**	**.296****	**.211****		
	Achievements			**.267****			
	Virtual economy			.190**			
	Chance						
Achiever	Achiever elements	.125**	.139**	**.281****	**.297****	**.201****	
	Learning	.155**			**.234****	.191**	
	Levels			**.212****	.184**		
	Progression			**.225****	.196**		
	Challenges	.130**	.134**	**.209****	**.418****	.196**	
	Certificates		.137**	**.252****	.176**		
	Quests			.160**	.141**	.159**	
Free spirit	Free spirit elements				.129**	**.214****	
	Unlockable content			.187**	.127**		
	Exploratory tasks					.186**	
	Nonlinear gameplay					.151**	
	Easter eggs						
	Creativity tools					**.225****	
	Narrative or story						
	Customization			.140**		.134**	
Disruptor	Disruptor elements			.125**	.163**	.191**	.172**
	Voting			.131**	.125**		
	Innovation platforms			.128**	.194**	.168**	.132**
	Development tools				.127**		
	Anonymity						
	Anarchic gameplay						**.207****

The correlation analysis reveals highly significant correlations between HEXAD types and certain game elements and largely supports the findings of both previous studies [24, 28, 29] and suggestions from the literature [21, 25], as the aggregated game elements show significant correlations with the assumed HEXAD types. Deepening the analysis to individual game elements, Socializers prefer social game elements, such as teams, social networks, competition (and related, leaderboards), and social discovery. Free Spirits are the users who like exploratory tasks, nonlinear gameplay, and creativity tools. Notably, Players show high correlations with a variety of game elements, similar to previous results [28]. Achievers are particularly motivated by challenges, learning, competition, and leaderboards. In contrast to the study by Tondello et al. [28], we find significant correlations only between Disruptors and anarchic gameplay, innovation platforms, and social competition, but not with development tools, anonymity, and voting mechanisms. In total, three other game elements besides anonymity, namely narratives, easter eggs, and chance, show no relevant significant correlation with HEXAD types ($\tau_b \leq .125$). However, we identify significant, although weak correlations between Philanthropists and proposed game elements such as gifting, knowledge sharing, and administrative roles that previous studies were unable to identify [28, 29].

In general, it can be stated that the HEXAD typology provides valuable guidance for tailoring gamification design and the selection of specific game elements for different users. However, since user types partially overlap, there are also relevant and significant correlations between HEXAD types and game elements not directly suspected in the scientific literature [21, 25]. In particular, Players seem to like a variety of game elements in addition to extrinsic rewards, such as social comparison and competition, levels and progression, challenges, and certificates, supporting the findings of previous studies [28].

5 Discussion and Implications

This study aimed to validate the English version, previously validated by Tondello et al. [23], and a corresponding German version of the gamification user types HEXAD scale to assess the value of the HEXAD scale for identifying different user types in gamified systems. Furthermore, our goal was to evaluate the relationships between HEXAD types and game element preferences with a large and diverse sample to confirm and extend the suggestions of scientific literature [21, 25] and previous studies [24, 28, 29].

Our results support the overall validity of the HEXAD scale in both English and German. However, the scale reliability analysis shows that the Free Spirit, Player, Disruptor (both languages) and Philanthropist (German) scales need further improvement to reach the acceptable threshold. In particular, the exploratory and confirmatory factor analysis reveals that certain items cause problems that lead to lower scale reliability. Items F2 and P3 and R3 require refinement in both languages, indicating that the items in their current form may not be appropriate to measure the corresponding HEXAD type, an observation consistent with the results of the previous validation study [23]. For example, the curiosity that Free Spirits exhibit when exploring a system

may not imply that Free Spirits are curious in the sense of a trait, as item F2 suggests ("I often let curiosity guide me"). Also, the concept of return of investment (R3: "Return of investment is important to me") may be too broad and not suitable to express the expectation of rewards for performing actions within the gamified system. Since items D1 and F4 present problems only in the English version of the HEXAD scale, which contradicts the findings of Tondello et al. [23], it can be assumed that the cause might be a lack of language proficiency to understand the concepts of self-presentation and provocation since two-thirds of the participants from over 50 countries answered the English version of the HEXAD scale, but only about 15% were from English-speaking countries (Canada, U.S., Australia, Great Britain, and New Zealand). It is possible that cultural differences in these concepts related to the open display of self-consciousness also play a role. Besides this need for further refinements, we consider the HEXAD scales in English and German as valuable instruments for further research and practice to identify HEXAD user types and use them as a basis for tailored gamification design.

Second, our results confirm the suggestions of scientific literature [21, 25] and findings from previous studies [24, 28, 29] on the relationships between HEXAD types and preference for certain game elements. We addressed the limited sample size of Tondello et al. [28] by increasing the sample to over 1.000 participants from 59 countries, and we included the wide variety of individual game elements that have previously only been considered in aggregated form [24, 30] to derive reliable recommendations for researchers and practitioners in efficiently selecting appropriate game elements for each user type. Supporting the validity of the HEXAD types and the suggested game element preferences [25], Socializers prefer social elements such as guilds or teams, social networks, social competition, and social discovery, while Achievers like social competition and leaderboards, but also learning, levels and progression, and challenges. Philanthropists especially favor gifting, knowledge sharing, and administrative roles, but are also attracted to teams and learning. Free Spirits, in turn, mostly like creativity tools, exploratory tasks, nonlinear gameplay, and customization, but are also motivated by learning and challenges.

Extending the theoretical propositions, our results show that Players are motivated by a variety of game elements. In addition to the extrinsic rewards stated in theory, such as prizes, points and, achievements, they also enjoy levels and progression, challenges, certificates, social comparison, social status, and social competition – which may be explainable by the observation that social approval is an even more powerful motivational reward than tangible prizes [64].

Another interesting finding is that Disruptors prefer anarchic gameplay and show weak relationships with innovation platforms and social competition, but in general, it seems difficult to design tailored gamification systems in a way that Disruptors appreciate the selected game elements. Considering that Disruptors are significantly less present than any other HEXAD type, the results should not alienate gamification designers, but rather Disruptors should be proactively involved in co-designing and improving the gamified system so that their drive to explore the boundaries of the system is used to improve quality instead of making them adversaries of the system [25].

Comprehensively revealing the individual game element preferences of different HEXAD types, our findings provide valuable guidance for researchers and practitioners in designing scientifically grounded, tailored gamification that takes into account the needs and motivations of different users.

6 Limitations and Future Work

As with any other scientific work, this study is not without limitations. Even though we consider our study design, which replicated previous studies on the validation of the HEXAD scale [23] and the relationships between HEXAD types and game element preferences [28], to be appropriate, our sample included a large number of participants with native languages other than English, which may have affected the validation of this scale. We invite further research to broaden our focus with more native English speakers to obtain more reliable results. Moreover, validating the HEXAD scale in other languages, such as Mandarin, Indian, or Japanese, would open up opportunities to use the HEXAD typology for tailored gamification design in many more countries and cultures than just focusing on Western culture.

Second, we identified specific items in the HEXAD scales that have low factor loadings and negatively affect internal scale reliability. We invite further research to build on our explanations of why these items may cause problems in order to improve the HEXAD scales and increase their validity.

In addition, we identify the Disruptor type as particularly challenging for tailored gamification design, as only single game elements showed significant correlations with the Disruptor type. Even though we suggest co-design as an alternative for onboarding Disruptors early in the design process, further research should investigate whether other game elements or game design processes not explored in this study can improve successful tailored gamification design for Disruptors.

7 Conclusion

Considering the needs and motivations of different user types is critical to designing gamification in such a way that it achieves the desired results. In this study, we validated an instrument for identifying different user types, the gamification user types HEXAD scale, in English and German. Although some items of the scale still need improvement, we consider the HEXAD scale a valuable tool for tailored gamification design in research and practice. In addition, we found significant correlations between HEXAD types and preference for specific game elements, highlighting the usefulness of the HEXAD typology for selecting game elements in tailored gamification design, as suggested by the scientific literature and previous studies. While Philanthropists are motivated by gifting, administrative roles, and knowledge sharing, Free Spirits mostly like creativity tools, exploratory tasks, and learning. Both Achievers and Players prefer challenges, leaderboards, levels, and competition, and Players are additionally attracted by extrinsic elements such as achievements, points, and rewards. Socializers enjoy social elements, such as teams, competition, social discovery, and social networks.

Finally, Disruptors can be motivated by anarchic gameplay and innovation platforms. Our findings contribute to refining the HEXAD scale as an instrument for identifying different user types and should successfully guide future gamification design in research and practice that is tailored to the needs and motivations of different user types to maximize the desired outcomes.

Appendix

Table 5. English and German user types HEXAD scales used in the study.

User types	Final validated English scale [23]	According German item from [60], based on the original scale from [28]	Used German item after committee selection
Philanthropist	P1: It makes me happy if I am able to help others	Es bereitet mir Freude, wenn ich anderen helfen kann	Es macht mich glücklich anderen zu helfen
	P2: I like helping others to orient themselves in new situations	Ich helfe anderen gerne dabei, sich in neuen Situationen zurecht zu finden	Ich mag es, anderen dabei zu helfen, sich in neuen Situationen zurecht zu finden
	P3: I like sharing my knowledge	Ich teile mein Wissen gerne mit anderen	Ich teile gerne mein Wissen
	P4: The well-being of others is important to me	Mir liegt das Wohl anderer am Herzen	Das Wohlergehen anderer ist mir wichtig
Socializer	S1: Interacting with others is important to me	Mir ist Interaktion mit anderen wichtig	Die Interaktion mit anderen ist mir wichtig
	S2: I like being part of a team	Ich bin gerne Teil eines Teams	Ich bin gerne Teil eines Teams
	S3: It is important to me to feel like I am part of a community	Es ist mir wichtig, mich als Teil einer Gemeinschaft zu fühlen	Es ist mir wichtig, mich als Teil einer Gemeinschaft zu fühlen
	S4: I enjoy group activities	Ich mag Gruppenaktivitäten	Gruppenaktivitäten machen mir Spaß
Free Spirit	F1: It is important to me to follow my own path	Es ist mir wichtig, meinen eigenen Weg zu gehen	Es ist mir wichtig, meinen eigenen Weg zu gehen
	F2: I often let curiosity guide me	Ich lasse mich oft von meiner Neugier leiten	Ich lasse mich oft durch Neugier leiten
	F3: Being independent is important to me	Mir ist meine Unabhängigkeit wichtig	Unabhängigkeit ist mir wichtig
	F4: Opportunities for self-expression are important to me	–	Gelegenheiten zur Selbstentfaltung sind wichtig für mich

(*continued*)

Table 5. (*continued*)

User types	Final validated English scale [23]	According German item from [60], based on the original scale from [28]	Used German item after committee selection
Achiever	A1: I like overcoming obstacles	–	Ich mag es, Hindernisse zu überwinden
	A2: I like mastering difficult tasks	Ich mag es, schwierige Aufgaben zu meistern	Ich mag es, schwierige Aufgaben zu meistern
	A3: It is important to me to continuously improve my skills	–	Es ist mir wichtig, meine Fähigkeiten ständig weiter zu entwickeln
	A4: I enjoy emerging victorious out of difficult circumstances	–	Ich mag es, aus schwierigen Umständen siegreich hervorzugehen
Player	R1: I like competitions where a prize can be won	Ich mag Wettbewerbe, bei denen ich einen Preis gewinnen kann	Ich mag Wettbewerbe, bei denen man Preise gewinnen kann
	R2: Rewards are a great way to motivate me	Belohnungen sind eine tolle Möglichkeit, mich zu motivieren	Belohnungen sind ein tolles Mittel, um mich zu motivieren
	R3: Return of investment is important to me	Es ist wichtig für mich, dass ich einen Nutzen von meinem Aufwand habe	Das Kosten-Nutzen Verhältnis ist mir wichtig
	R4: If the reward is sufficient, I will put in the effort	Wenn der Lohn stimmt, strenge ich mich gerne an	Bei angemessener Belohnung strenge ich mich gerne entsprechend an
Disruptor	D1: I like to provoke	Ich provoziere gerne	Ich provoziere gerne
	D2: I like to question the status quo	Ich mag es, den Status Quo in Frage zu stellen	Ich stelle den Status Quo gerne in Frage
	D3: I see myself as a rebel	Ich sehe mich als Rebell	Ich würde mich als rebellisch bezeichnen
	D4: I dislike following rules	Ich halte mich nicht gerne an Regeln	Ich halte mich nicht gerne an Regeln

Table 6. Rotated factor loadings for the HEXAD survey items in English (factor loads $\geq$ 0.25).

User type	Items	Factor 1 (S)	Factor 2 (P)	Factor 3 (D, F)	Factor 4 (A)	Factor 5 (R)	Factor 6
Socializer	S4	.811					
	S2	.798					
	S1	.687					
	S3	.434	.364				
Philanthropist	P4		.736				
	P2		.570				
	P1		.564				
	P3		**.407**				**.270**

(*continued*)

Table 6. (*continued*)

User type	Items	Factor 1 (S)	Factor 2 (P)	Factor 3 (D, F)	Factor 4 (A)	Factor 5 (R)	Factor 6
Disruptor	D3			.753			
	D4			.583			
	D2			.525			
	D1	**.337**		**.368**			
Free spirit	F3			.410			
	F4		**.320**	**.398**			
	F1			**.365**			
Achiever	A2				.942		
	A4				.619		
	A1				**.483**		**.393**
	A3				.399		
Player	R4					.740	
	R2					.734	
	R3					.448	
	R1					.400	
Free spirit	**F2**						**.431**

Table 7. Rotated factor loadings for the HEXAD survey items in German (factor loads $\geq$ 0.25).

User type	Items	Factor 1 (S)	Factor 2 (A)	Factor 3 (D)	Factor 4 (R)	Factor 5 (F)	Factor 6 (P)
Socializer	S1	.787					
	S3	.674					
	S4	.650					
	S2	.613					
Achiever	A2		.812				
	A1		.614				
	A3		.550				
	A4		.507				
Free spirit	**F2**		**.251**				
Philanthropist	**P3**		**.294**				**.256**
Disruptor	D3			.703			
	D4			.529			
	D1			.529			
	D2	**.337**		**.483**			
Player	R4				.836		
	R2				.728		
	R1				.461		
	R3				**.369**		

(*continued*)

Table 7. (*continued*)

User type	Items	Factor 1 (S)	Factor 2 (A)	Factor 3 (D)	Factor 4 (R)	Factor 5 (F)	Factor 6 (P)
Free spirit	F3					.670	
	F1					.569	
	F4					.407	
Philanthropist	P1						.605
	P4						.577
	P2						.545

Table 8. Regression weights for survey items of the HEXAD scales in English and German.

User type	Items	β (EN)	B (EN)	SE (EN)	β (D)	B (D)	SE (D)
Philanthropist	P1	,657	1,000		,622	1,000	
	P2	,713	1,385	,107	,540	1,149	,179
	P3	,573	1,026	,088	**,284**	**,508**	,127
	P4	,621	1,285	,105	,675	1,423	,222
Socializer	S1	,777	1,000		,755	1,000	
	S2	,849	1,115	,051	,687	,825	,078
	S3	,632	,846	,051	,641	,868	,086
	S4	,772	1,027	,050	,688	,872	,082
Player	R1	,483	1,000		,539	1,000	
	R2	,733	1,096	,113	,692	1,016	,123
	R3	**,431**	**,709**	,089	**,346**	**,491**	,095
	R4	,674	1,111	,113	,828	1,261	,158
Achiever	A1	,609	1,000		,526	1,000	
	A2	,825	1,551	,114	,898	1,571	,192
	A3	,548	,913	,079	,492	,805	,115
	A4	,638	,938	,073	,622	1,096	,134
Free Spirit	F1	,623	1,000		,669	1,000	
	F2	**,298**	**,463**	,085	**,347**	**,475**	,092
	F3	,625	1,087	,165	,730	1,120	,142
	F4	**,342**	**,664**	,110	,569	,816	,107
Disruptor	D1	**,402**	**1,000**		,525	1,000	
	D2	,506	,925	,118	,580	,885	,128
	D3	,794	1,867	,230	,768	1,373	,192
	D4	,560	1,231	,150	,512	,925	,143

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