

The relationship between player types and gamification feature preferences

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Abstract. In this study, we investigate how users' general gaming preferences (i.e. on dimensions of achievement, immersion and social orientations) are related to their perception of the (enjoyment, usefulness, ethicalness motivationability and continued use) of different gamification features. The study was amongst 144 students as a vignette study, framed in the context of gamification of the Moodle educational platform. The results show that, while achievement – orientation in gaming preferences is positively associated with perceptions of achievement-related gamification features, immersion and social gaming orientations had little, if any, positive associations with the different perceptions related to gamification features. While the results indicate that achievement-related gamification may be preferred by achievement-oriented players, overall players' gaming preferences types may not be a comprehensive predictor for gamification preferences.

Keywords: Gamification, personalization, player types

1 Introduction

Gamification research and practice have been growing since the beginning of the 2010's. It has been introduced to various facets of life such as to education, health management, crowdsourcing and political participation amongst other areas (see [13, 19, 21] for reviews). Gamification refers to designing systems, services, activities and processes to afford engaging, gameful experiences similar to those afforded by games [8]. Perhaps the most prototypical form of gamification are human-computer interfaces (such as in web services) that have been imbued with game mechanics (e.g., [4, 14, 19, 32]). While the majority of research seems to suggest that gamification can overall be an effective method of user engagement, the literature, similarly, suggests that preferences for gamification differ across individuals, depending on factors such as personality, gender, or goal orientation [1, 9, 18, 19, 22].

Gamification, furthermore, is a 'dual-purposed' technology, often considered a motivational technology that aims to not only facilitate usefulness/instrumentality, but to also facilitate motivating hedonic experiences such as those of enjoyment [19, 20]. Moreover, gamification is related to attitude and behavior change, and therefore, how ethically gamification is implemented is a crucial aspect against which gamification should be evaluated [17, 27]. Furthermore, any gamification will ultimately fail unless users are not willing to continue using it [10].

However, fairly little research exist on what user traits are associated with the different value gamification can afford. Accordingly, to facilitate the success of gamification, its design should be attuned to the preferences of its expected users and it, furthermore, should accommodate users' perceptions of gamification enjoyment, usefulness, ethicality, and motivationability while designing gamification. Although gaming preferences and player types are considered a key way to segment gamification users and designed for them, relatively little research has gone into investigating player types in gamification. This research investigates the questions: *What is the relationship between gaming preferences of individuals (achievement, immersion and social orientation) and intentions to use different gamification features (achievement, immersion and social), as well as perception towards them; i.e. enjoyment, usefulness, ethicality, and motivationability?*. The study was conducted amongst N=144 students as a vignette study, framed in the context of gamification of the Moodle educational platform.

2 Background

The practice of recognizing personal differences in design is not foreign to games nor gamification. Player types abstract and capture individual qualities at a high level, providing a way to largely design for different individuals [30]. Many, in game studies, have, hence, investigated differences in gaming preferences and preferred play style [2, 12, 31, 33]. In the context of gamification, research has similarly investigated different player orientations and their perceptions of and preferences for gamification [30]. Being a technology that combines gaming (entertainment) and utility, gamification researchers have also investigated user types, [23, 32], goal orientations [10], and demographic differences [18], as ways to tailor gamification to its target user base.

Categorizations of gamification features and player/user types often tend to divide both into categories that can be conceptualized as immersion, achievement, and social interaction-related categories [11, 12, 19, 25, 28, 33, 34]. Not only are these categorizations established (e.g. [32, 35]), they reflect seminal psychology theory on motivation. Notably, the self-determination theory [26], which outlines that individuals have three basic psychological needs that drive (intrinsic) motivation, the needs for; autonomy, competence, and relatedness, often stimulated by immersion, achievement, and social interaction gamification features respectively [32]. Similarly, these categorizations reflect the understanding of goal-setting orientations, often categorized as achievement, mastery and avoidance orientations, which have been investigated in the

context of gamification showing the ability of achievement and mastery-oriented gamification in supporting most of these goal orientation [9].

Hence, the categorization of gamification players' orientations and features as immersion, achievement, and social interaction related categories is supported across fields. Immersion-related features attempt to immerse players in self-purposeful activities, through e.g., avatars, narratives, and roleplay. Achievement-related features attempt to foster a sense of accomplishment through e.g., badges, missions, and leaderboards. Social interaction-related features create interactive communities through, e.g., teams, and chats [12, 19, 25, 28, 33, 34]. Individuals tend to differ in their perception of these feature categories, often based on their own personal orientations [9, 23, 32, 30]. These differences across users with regards to gamification often pertain to gamification use intentions and perceptions of its enjoyment, usefulness, ethicality, and motivationability [10, 17, 19, 20, 27]. Accordingly, we hypothesize:

H1: Achievement gaming preference of an individual is positively associated with perceived H1a) enjoyment, H1b) usefulness, H1c) ethicality, H1d) motivation, of as well as H1e) intention to use achievement related gamification features.

H2: Immersion gaming preference of an individual is positively associated with perceived H2a) enjoyment, H2b) usefulness, H2c) ethicality, H2d) motivation, of as well as H2e) intention to use achievement related gamification features.

H3: Social gaming preference of an individual is positively associated with perceived H3a) enjoyment, H3b) usefulness, H3c) ethicality, H3d) motivation, of as well as H3e) intention to use achievement related gamification features.

We additionally investigated all connections between the studied variables (Figure 1), as a precautionary measure to identify possible relationships outside hypothesized.

3 Data and methods

3.1 Procedure

This research was implemented as a questionnaire-based vignette study. Participants were presented with imagined designs (see figures 2 & 3) for a learning platform and asked to indicate their preference for having the designs, being evaluated, implemented in for example the Moodle learning platforms that they were currently using. As such, a qualifying question about participants' previous experience with Moodle was employed at the start of the questionnaire to filter out participants who have not had any previous experience with Moodle. The questionnaire investigated 12 different game elements belonging to the achievement, immersion and social interaction gamification categories previously outlined. The investigated elements were leaderboard, badges, challenges, quests, teams, sharing, social discovery, discussion forum, roleplay, story, avatar and creative tools. The participants were asked to indicate, on a bipolar scale, the extent to which they found these elements harmful VS beneficial, ethical VS immoral, motivating, VS depressing, boring VS enjoyable, and whether they would like to use a learning platform that includes the feature evaluated. Gaming preferences (achievement, immersion and social interaction motivation orientation), each measure the preference for a certain gaming style via the measurement of prefer-

ence of interaction with related game features or activities. The orientations were measured by asking the participants to generally rate the importance of key aspects of games to them, using items adapted from Yee et al. [34] on a 7-point likert scale.

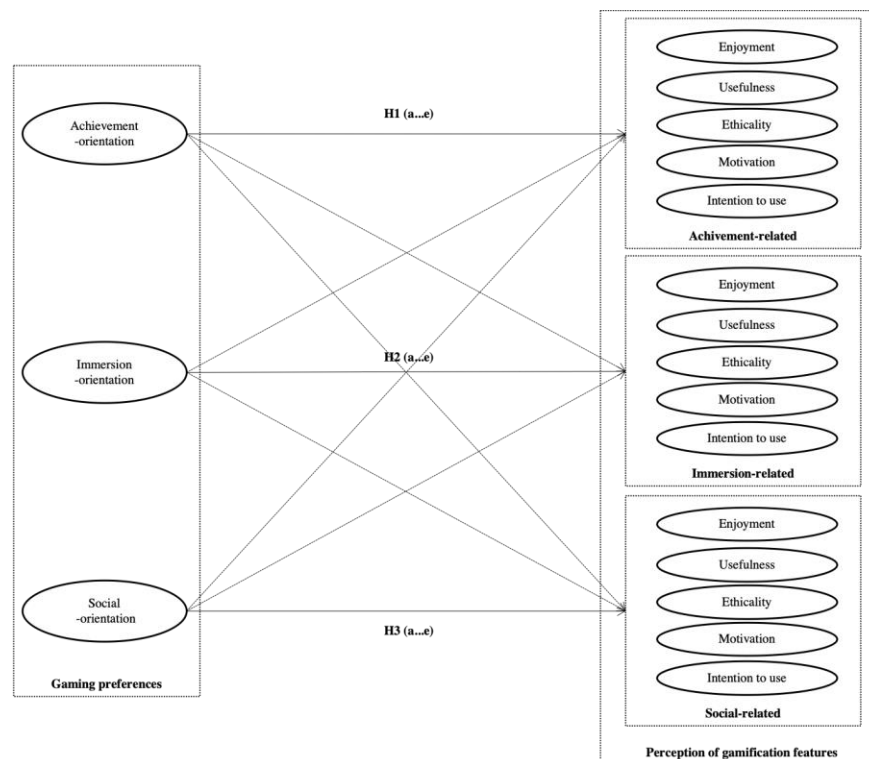


Fig. 1. Research model and hypotheses



Fig. 2. Imagined leaderboard

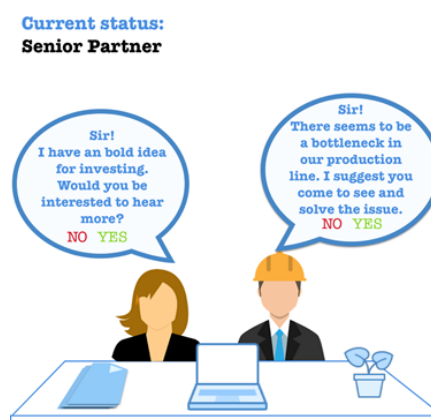


Fig 3. Imagined roleplay scenario

3.2 Participants

The questionnaire was open from April 1st to the end of September 2019. 144 participants completed the questionnaire, passing the qualifying question. The questionnaire distribution was mainly via social media, such as through Facebook, Telegram, etc. General information of the respondents is presented in table 1.

Table 1. Demographic information of the participants

Variable		%	Variable		%
Gender	Female	33 %	Education	Basic education	1 %
	Male	67 %		Vocational School	1 %
Age	18-21	6 %		High School	19 %
	22-25	38 %		Bachelor's degree	44 %
	26-29	52 %		Master's degree	35 %
	30-33	3 %			
	34-37	1 %			

3.3 Reliability and Validity

All item loadings, presented in table 2, are above Chin's [3] threshold of 0.700, except for ACH1. However, this indicator was retained in this model, as it had an accepted correlation level, whilst being over the suggested 0.400 acceptance threshold [6]. Discriminant validity was also met as the HTMT values are lower than 0.85 [16]. In addition, we assessed the collinearity of indicators of the three dependent variables as they represent a formative measurement model. The VIFs of the items ranged from 2.302 to 1.006, significantly below the common thresholds of 3 or 5 [5], which suggests that multicollinearity is not a concern.

Table 2. Validity and reliability of reflective constructs

Items	Outer loadings
Achievement-orientation ($\alpha = 0.751$, CR = 0.839, AVE = 0.574)	
ACH1. Becoming more powerful.	0.535
ACH2. Winning.	0.752
ACH3. Getting the top score/level/points.	0.822
ACH4. Being the best.	0.877
Immersion-orientation ($\alpha = 0.771$, CR = 0.853, AVE = 0.593)	
IMM1. Story and theme.	0.791
IMM2. Feeling that you are living the game.	0.681
IMM3. Exploring the game-world.	0.808
IMM4. Background and history of characters.	0.792
Social-orientation ($\alpha = 0.911$, CR = 0.938, AVE = 0.790)	
SOC1. Chatting with other players.	0.902

SOC2. Keeping in touch with your friends.	0.812
SOC3. Feeling connected to other people.	0.916
SOC4. Interacting with other players.	0.919

4 Results

The results (Table 3) show that achievement orientation was positively associated with perceived enjoyment ($\beta = 0.368^{**}$), usefulness ($\beta = 0.396^{*}$), motivationability ($\beta = 0.358^{***}$) and use intention ($\beta = 0.446^{***}$) of achievement-related gamification features. Thus, H1a, H1b, H1d and H1e were not rejected. However, the relationship between achievement-orientation and the perceived ethicalness of achievement-related gamification features was statistically insignificant ($\beta = 0.300$), and, H1c was rejected. Immersion orientation was positively associated with perceived usefulness ($\beta = 0.297^{**}$) and use intention ($\beta = 0.288^{**}$) of immersion-related gamification features. Therefore, hypotheses H2b and H2d were not rejected. However, associations between immersion-oriented gamification features and perceptions of enjoyment ($\beta = 0.188$), motivationability ($\beta = 0.115$) and use intention ($\beta = 0.214$) were not statistically significant. Therefore, hypotheses H2a, H2c, H2e were rejected. Social orientation was not associated with any of the preferences related to gamification features. Hence, H3a to H3e were rejected. Table 4 presents variance explained by the model.

Table 3. The full results of the structural equation model

Relationship	β	P	CI		Hypotheses
			2.5%	97.5%	
ACH -> Enjoyment_ACHI	0.368**	0.009	0.028	0.579	H1a: supported
ACH -> Usefulness_ACHI	0.396 *	0.050	-0.359	0.554	H1b: supported
ACH -> Ethicality_ACHI	0.300	0.161	-0.373	0.483	H1c: not supported
ACH -> Motivation_ACHI	0.358***	0.001	0.158	0.527	H1d: supported
ACH -> Use intentions_ACHI	0.446***	0.000	0.278	0.605	H1e: supported
ACH -> Enjoyment_IMM	0.151	0.413	-0.262	0.429	-
ACH -> Usefulness_IMM	-0.189	0.226	-0.404	0.220	-
ACH -> Ethicality_IMM	-0.144	0.425	-0.341	0.305	-
ACH -> Motivation_IMM	-0.048	0.780	-0.348	0.332	-
ACH -> Use intentions_IMM	0.253	0.296	-0.367	0.460	-
ACH -> Enjoyment_SOC	0.006	0.980	-0.331	0.463	-
ACH -> Usefulness_SOC	0.102	0.598	-0.343	0.319	-
ACH -> Ethicality_SOC	0.267	0.358	-0.430	0.451	-
ACH -> Motivation_SOC	0.042	0.845	-0.366	0.389	-
ACH -> Use Intention_SOC	0.021	0.902	-0.280	0.350	-
IMM -> Enjoyment_ACHI	-0.018	0.906	-0.314	0.311	-
IMM -> Usefulness_ACHI	0.015	0.904	-0.218	0.282	-
IMM -> Ethicality_ACHI	0.000	0.999	-0.416	0.377	-
IMM -> Motivation_ACHI	0.044	0.743	-0.203	0.317	-
IMM -> Use Intention_ACHI	0.043	0.687	-0.153	0.256	-
IMM -> Enjoyment_IMM	0.188	0.122	-0.073	0.399	H2a: not supported
IMM -> Usefulness_IMM	0.293**	0.033	-0.039	0.487	H2b: supported
IMM -> Ethicality_IMM	0.115	0.465	-0.244	0.360	H2c: not supported
IMM -> Motivation_IMM	0.288**	0.024	-0.013	0.473	H2d: supported
IMM -> Use Intentions_IMM	0.214	0.132	-0.079	0.429	H2e: not supported
IMM -> Enjoyment_SOC	0.100	0.454	-0.182	0.333	-

IMM -> Usefulness_SOC	0.198	0.407	-0.356	0.408	-
IMM -> Ethicality_SOC	0.104	0.524	-0.241	0.372	-
IMM -> Motivation_SOC	0.111	0.470	-0.204	0.358	-
IMM -> Use intentionsSOC	0.131	0.366	-0.188	0.378	-
SOC -> Enjoyment_ACHI	-0.040	0.742	-0.294	0.184	-
SOC -> Usefulness_ACHI	-0.074	0.536	-0.290	0.199	-
SOC -> Ethicality_ACHI	-0.010	0.946	-0.238	0.321	-
SOC -> Motivation_ACHI	0.178	0.075	-0.045	0.344	-
SOC -> Use intentionsACHI	-0.004	0.970	-0.213	0.161	-
SOC -> Enjoyment_IMM	-0.047	0.775	-0.346	0.273	-
SOC -> Usefulness_IMM	0.083	0.595	-0.290	0.299	-
SOC -> Ethicality_IMM	-0.049	0.788	-0.289	0.342	-
SOC -> Motivation_IMM	0.048	0.760	-0.300	0.288	-
SOC -> Use intentionsIMM	-0.119	0.630	-0.429	0.426	-
SOC -> Enjoyment_SOC	0.237	0.313	-0.366	0.469	H3a: not supported
SOC -> Usefulness_SOC	-0.151	0.486	-0.364	0.369	H3b: not supported
SOC -> Ethicality_SOC	-0.182	0.409	-0.367	0.367	H3c: not supported
SOC -> Motivation_SOC	0.148	0.423	-0.275	0.398	H3d: not supported
SOC -> Use intentionsSOC	0.224	0.227	-0.279	0.463	H3e: not supported

β = standard regression coefficient, CI = confidence interval, * $P < 0.1$, ** $P < 0.05$ *** $P < 0.01$

Table 4. Proportions of variance explained for dependent variables

Achievement-related	Rsquare	Immersion-related	Rsquare	Social interaction-related	Rsquare
Enjoyment_ACHI	0.125	Enjoyment_IMM	0.057	Enjoyment_SOC	0.081
Usefulness_ACHI	0.141	Usefulness_IMM	0.117	Usefulness_SOC	0.048
Ethicality_ACHI	0.088	Ethicality_IMM	0.034	Ethicality_SOC	0.074
Motivation_ACHI	0.219	Motivation_IMM	0.090	Motivation_SOC	0.052
Intention to use_ACHI	0.204	Intention to use_IMM	0.100	Intention to use_SOC	0.089

5 Discussion

The aim of this research is to investigate how the relationship between video gaming preferences (achievement, immersion and social orientation) and perceptions of (usefulness, enjoyment, motivationability, ethicalness and use intentions) of gamification feature categories (achievement, immersion and social interaction-related features). Our results are overall in line with previous research. Even though we explored all possible relationships between gaming preferences and all categories of gamification features, no relationships, outside hypothesized based on previous literature, were uncovered. Achievement-oriented players positively perceived achievement-related gamification, immersion-oriented players, immersion-related gamification, while social interaction-oriented players did not have statistically significant perceptions of social or any of the investigated gamification feature categories.

Achievement-oriented players perceived achievement-related gamification as significantly enjoyable, useful, motivating and intend to use its features if implemented in Moodle. This is in line with previous research that has indicated this preference of achievement-oriented individuals for achievement-based gamification [7, 9, 29, 30].

On the other hand, immersion-oriented players perceived immersion-related gamification both as useful and motivating, while no significant associations were found between social preferences and enjoyable or ethical perceptions of any gamification feature categories. While the results on motivation and use intentions for both, achievement and immersion-oriented players are in line with previous research that indicates that gamification features are motivating [4, 19, 35] and beneficial [14, 25, 35] which may encourage gamification use, our results suggest that more research is needed to investigate whether the motivationability and benefits from gamification coincide with experiences of enjoyment as is theoretically presumed [4, 8]. Recent research specifically indicates that gamification features differ in their ability to facilitate gameful experiences [15] and related enjoyable experiences [22, 32, 25]. Hence, it is possible that the feature categories investigated in our research were better able to induce motivation and usefulness, compared to feelings of enjoyment.

As our results indicate, the investigated gamification feature categories are not significantly associated with social preferences. While past research suggests that individuals may be likely to use gamification for social purposes [9, 10], research also indicates that not all popular gamification features are equally able to induce positive social experiences [15], some may negatively affect experiences of social feedback [14] and inhibit personal freedoms [35]. These positive and negative social experience from gamification are often influenced by factors such as perception of an application during actual use [20] and whether an individual's friends are using the same platforms or if other like-minded individuals are present on it [9, 10, 14]. These factors, amongst others, may not have been reflected by our study design that asked individuals to reflect on imagined additions to an application. Nonetheless, future research is encouraged to investigate gamification designs for social players, especially in light of the outlined contradictory results on social gamification from previous research.

Overall, as the variance explained by the model is relatively low, it appears that perhaps the investigated gaming preferences (achievement, social and immersion-oriented) may not be an ideal means to segmented gamification users. Player types, indicated by gaming preferences may not yet be the most useful categorization as, although there are many such categorizations, we still know relatively little about which is more accurate in reflecting the complexity of individuals [12, 29, 30] and most typologies are criticized for attempting to put individuals in narrow boxes that may not reflect the reality of player preferences. While, this research examined player orientations, rather than exclusive player types, meaning that participants could have more than one orientation at a time, future research is encouraged to adopt different player categorization and. to explore other means to personalize gamification such as based on education, age, technical skills, needs, personality or lifestyle.

As this study employed a vignette-based questionnaire, data is self-reported and, as is the case with survey-based research, might not reflect actual behavior and exhibit self-selection bias [24]. Furthermore, this research asked the participants to imagine gamification overlaid on a tool they were familiar with, rather than investigate the use of a gamified tool. We encourage future researchers to adopt different ways to examine user preferences such as in combination with analysis of server log data or through qualitative interviews that allow a nuanced understanding of users. Further-

more, the context of our study has been an educational platform. Future research is encouraged to expand on this work and investigate player types in different contexts, through different means and with perhaps different gamification implementations.

References

1. Alexandrova, A., Rapanotti, L. (2019). Requirements analysis gamification in legacy system replacement projects. *Requirements Engineering*
2. Bartle, R. (1996). Hearts, clubs, diamonds, spades: Players who suit MUDs.
3. Chin, W. W. (1998). Issues and opinion on structural equation modeling. *MIS Quarterly, MIS Quarterly & The Society for Information Management*, 1–1.
4. Deterding, S. (2015). The lens of intrinsic skill atoms: A method for gameful design. *Human-Computer Interaction*, 30(3–4), 294–335.
5. Diamantopoulos, A., Siguaw, J. A. (2006). Formative versus reflective indicators in organizational measure development: A comparison and empirical illustration. *British Journal of Management*, 17(4), 263–282.
6. Gefen, D., Straub, D., & Boudreau, M.-C. (2000). Structural equation modeling and regression: Guidelines for research practice. *Communications of the Association for Information Systems*, 4(1), 1–7.
7. Hakulinen, L., & Auvinen, T. (2014, April). The effect of gamification on students with different achievement goal orientations. In *2014 international conference on teaching and learning in computing and engineering* (pp. 9–16). IEEE.
8. Hamari, J. (2019). Gamification. In G. Ritzer & C. Rojek (Eds.), *The Blackwell Encyclopedia of Sociology*. New York John Wiley & Sons.
9. Hamari, J., Hassan, L., & Dias, A. (2018). Gamification, quantified-self or social networking? Matching users' goals with motivational technology. *User Modeling and User-Adapted Interaction*, 28(1), 35–74.
10. Hamari, J., & Koivisto, J. (2015). Why do people use gamification services? *International Journal of Information Management*, 35(4), 419–431.
11. Hamari, J., Koivisto, J. & Sarsa, H. 2014. Does Gamification Work? — A Literature Review of Empirical Studies on Gamification. 47th Hawaii International Conference on System Science
12. Hamari, J., & Tuunanen, J. (2014). Player types: A meta-synthesis. *Transactions of the Digital Games Research Association*, 1(2), 29–53.
13. Hassan, L., & Hamari, J. (2019). Gamification of e-participation A Literature Review. In *Proceedings of the 52nd Hawaii International Conference on System Sciences (HICSS'52)* (pp. 3077–3086). Maui HI, USA.
14. Hassan, L., Dias, A., & Hamari, J. (2019). How motivational feedback increases user's benefits and continued use: A study on gamification, quantified-self and social networking. *International Journal of Information Management*, 46, 151–162.
15. Hassan, L., Xi, N., Gurkan, B., Koivisto, J., & Hamari, J. (2020). Gameful self-regulation: A study on how gamified self-tracking features evoke gameful experiences. *Proceedings of 53rd Hawaii International Conference on System Sciences (HICSS'53)*, Hawaii, USA.
16. Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the academy of marketing science*, 43(1), 115–135.
17. Kim, T. W., & Werbach, K. (2016). More than just a game: ethical issues in gamification. *Ethics and Information Technology*, 18(2), 157–173.

18. Koivisto, J., & Hamari, J. (2014). Demographic differences in perceived benefits from gamification. *Computers in Human Behavior*, 35, 179–188.
19. Koivisto, J., & Hamari, J. (2019). The rise of motivational information systems: A review of gamification research. *International Journal of Information Management*.
20. Köse, D. B., Morschheuser, B., & Hamari, J. (2019). Is it a tool or a toy? How user conceptions of a system's purpose affect their experience and use. *International Journal of Information Management*, 49, 461–474.
21. Morschheuser, B., Hamari, J., & Koivisto, J. (2016). Gamification in crowdsourcing: A review. In *Proceedings of the 49th Annual Hawaii International Conference on System Sciences (HICSS)* (pp. 4375–4384). Hawaii, USA: IEEE.
22. Morschheuser, B., Hassan, L., Werder, K., & Hamari, J. (2018). How to design gamification? A method for engineering gamified software. *Information and Software Technology*, 95, 219–237.
23. Monterrat, B., Desmarais, M., Lavoué, E., & George, S. (2015, June). A player model for adaptive gamification in learning environments. In *International conference on artificial intelligence in education* (pp. 297–306). Springer, Cham.
24. Nunnally, J. (1978). *Psychometric methods*. New York: McGraw-Hill.
25. Peng, W., Lin, J. H., Pfeiffer, K. A., & Winn, B. (2012). Need satisfaction supportive game features as motivational determinants: An experimental study of a self-determination theory guided exergame. *Media Psychology*, 15(2), 175–196.
26. Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68–78.
27. Shahri, A., Hosseini, M., Phalp, K., Taylor, J., & Ali, R. (2014, November). Towards a code of ethics for gamification at enterprise. In *IFIP Working Conference on The Practice of Enterprise Modeling* (pp. 235–245). Springer, Berlin, Heidelberg.
28. Snodgrass, J. G., Dengah, H. F., Lacy, M. G., & Fagan, J. (2013). A formal anthropological view of motivation models of problematic MMO play: Achievement, social, and immersion factors in the context of culture. *Transcultural psychiatry*, 50(2), 235–262.
29. Mora, A., Tondello, G.F., Calvet, L., González, C., Arnedo-Moreno, J., Nacke, L.E. (2019). The quest for a better tailoring of gameful design: An analysis of player type preferences. *ACM International Conference Proceeding Series*, art. no. 1.
30. Tondello, G. F., Mora, A., & Nacke, L. E. (2017). Elements of Gameful Design Emerging from User Preferences. In *Proceedings of the Annual Symposium on Computer-Human Interaction in Play - CHI PLAY '17* (pp. 129–142). Amsterdam, Netherlands: ACM.
31. Vahlo, J., & Hamari, J. (2019). Five-Factor Inventory of Intrinsic Motivations to Gameplay (IMG). In *Proceedings of the 52nd Annual Hawaii International Conference on System Sciences (HICSS)*, Hawaii, USA.
32. Xi, N., & Hamari, J. (2019). Does gamification satisfy needs? A study on the relationship between gamification features and intrinsic need satisfaction. *International Journal of Information Management*, (46), 210–221.
33. Yee, N. (2006). Motivations for play in online games. *Cyberpsychology and Behavior*, 9 (6), pp. 772–775.
34. Yee, N., Ducheneaut, N. and Nelson, L. (2012). Online gaming motivations scale: Development and validation. *Conference on Human Factors in Computing Systems - Proceedings*.
35. Wolf, T., Weiger, W. H., & Hammerschmidt, M. (2019). Experiences that matter? The motivational experiences and business outcomes of gamified services. *Journal of Business Research*.