

Gamification Design for Goal Activation and Goal Striving in Digital Marketing and Innovation Management

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Abstract

Gamification can enrich applied contexts with a playful design that supports goal activation and motivates consumers to strive for their goals. This has much potential for digital marketing and innovation management by making the interaction with products and advertisements more enjoyable in online and offline environments. The success of game designs hinges on their adaptation to a situation that creates a unique user experience for the personal goals of a target group. Specific game elements make products more appealing by providing goal-setting instructions and feedback. Moreover, gameful instructions can support goal completion by assisting in self-regulation when striving for short- and long-term goals. We apply psychological theories to practical examples on the implementation of consumer goals in innovation, eHealth and app design.

Keywords 1

Gamification, goals, user experience, digital marketing, innovation, advertising, game design

1. Introduction

Gamification is a design tool to enrich various applied contexts with playful game elements. This is intended to support a positive user experience and motivate users to execute specific behaviors in non-game contexts. Gamification has much potential for marketing and innovation by making products more attractive and fun [1]. This can be addressed in sales management when advertising products in online and offline shopping environments. We highlight the specific game elements that make products more appealing by adding value to consumer goals, such as avatars, social media, leaderboards or challenges [1].

The effects of game designs hinge to a large extent on their adaptation to a practical situation that creates a unique user experience when interacting with the product [2]. Gamification at the point of sale is expected to make it more likely that consumers have a positive attitude and, thus, higher buying intentions [1]. Moreover, it can be used as a communication tool in service apps,

websites or digital platforms that enable social interactions with friends, service personnel or other users online [2, 3].

Psychological theories on motivation and self-regulation inform us about the underlying consumer goals that have an influence to buy and use a product. In particular, self-regulatory processes, such as flow, intrinsic motivation and social comparisons are relevant indicators if consumers enjoy the communication with interactive technologies [1, 3]. Furthermore, gamification adds to innovative products by signaling novelty [4].

With an integrative perspective, we focus on goal-setting and feedback processes within gamification designs in applied contexts. In the end, practical examples are outlined, such as gamification of self-regulation in eHealth apps and innovation management. We conclude with an outlook on the potential of artificial intelligence in the real-time monitoring of self-regulation and livestreaming game play.

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2. Motivation in gamified marketing communication

Gameful designs are based on elements of full games and stimulate user experience by increasing enjoyment and flow while interacting with a product [1]. Flow is a feeling of optimal engagement and the positive experience of challenge and focus while performing a specific behavior [5]. When developing new products, game elements make advertisements more appealing to the consumer and provide a unique shopping experience [1]. It is important that game elements are implemented successfully in order to be useful instruments that motivate consumers to achieve desired outcomes [6].

Motivational elements can be gamified and employed even in normal advertisements, such as slogans in communication campaigns, on flyers, posters or TV-commercials. Game elements are increasingly used in marketing campaigns, as the consumer perceives them as useful extras. The aim is to stimulate buying intentions and fun when consumers interact with a product [1]. Moreover, gamification is often used to increase and strengthen engagement, participation and user behavior [7, 8].

It is much easier for marketers and sales managers to simply use parts of games when presenting advertisements online or at the point of sale. If intrinsic motivation is stimulated, the consumer may truly enjoy an advertisement, and the interaction with a product may lead to enjoyment and flow [1]. Intrinsically motivating elements of games are, for example, characters, avatars or storylines from real games that may increase flow and social interaction [1, 9].

Typically, however, externally motivating incentives are employed within game designs to persuade consumers to use technologies, applications and programs more frequently. These are usually points, bonuses and leaderboards, the simple extrinsic incentives [1, 9]. Bittner and Schipper [1] investigated game elements that provide an extrinsic and intrinsic value for the consumer and, consequently, increase the effectiveness of this technology. Extrinsic game elements were found to make a contribution to buying intentions and enjoyment if they were combined with intrinsic elements that induce flow [1].

Therefore, a combination of intrinsic and extrinsic game elements would be beneficial for the positive perception of gamified technologies

and is described in 2.2. As a goal, the feeling of competence can be induced in the consumer to establish a sense of intrinsic motivation by additionally presenting extrinsic game elements, such as bonuses and rewards [10]. Because intrinsic motivation can be enhanced by extrinsic elements, both elements usually are important for gamified products [1].

2.1. Point of sale: Online and offline shopping and advertising

With the COVID-pandemic, we have reached the digital age, with more and more online-shopping and virtual chatbots replacing personal communication. The pandemic accelerated the trend towards new technology, and telepresence has become normal. Gamification has the advantage that it has much potential to enrich online and offline settings by making products more interesting for the consumer [1].

In the real world, gamification can be displayed within stores, at the point of sale or directly presented on a product or packaging. Furthermore, it can be embedded into advertisements and commercials in the conventional media as an interesting extra.

For online shopping, gamification offers additional value by directing users to websites, apps or social media platforms that make it possible to further interact with gamified options. Additional options can also be advertised in offline environments, by pointing out specific links to the gamified services of a product.

Thus, elements of games can be presented in a variety of settings in digital marketing and form a comprehensive design that adapts environments to the goals of the consumer. We now explain the different facets of game elements that are effective to support personal goal striving.

2.2. Goal activation with specific game elements

Goals are desirable end states that give direction to a consumers' behavior [11]. Consumer goals can be triggered by environmental nudges and result in automatic goal pursuit [12, 13].

To influence the behavior and motivation of consumers, specific game elements can be implemented that activate consumer goals and assist in goal-setting. For example, goals for

achievement and competence can be activated by nudges [13] and subsequently influenced by positive feedback and rewards [12]. Earning points for specific behaviors, badges for special achievements or continuous benefits like game levels may reward consumers to stay motivated and continue to perform an intended behavior [6, 14]. In digital marketing, avatars and role playing characters are suitable game elements that motivate continuous goal striving. They allow users to slip into roles of famous stars or complete different fictional missions while performing real-time achievement tasks that lead to goal completion.

Ultimately, this means that consumers should be supported to reach their personal goals when interacting online or offline [12]. Intrinsic and extrinsic motivational elements can be combined to make it truly enjoyable for an individual to perform a desired behavior [10]. More specifically, enjoyment and flow can be incorporated into game designs with storylines that create an optimal balance between challenge and fun. To reach this, challenges should not be too easy, but achieving goal progress makes an interaction with a product more enjoyable [5]. Interactive environments give the opportunity for feedback on goal pursuit in missions and challenges. In social contexts, achievement and power motives are triggered when users are able to demonstrate their skills and capabilities to others [14]. Specific game elements offer the possibility to present individual successes and progress, such as the current game level or rewarding trophies and achievements.

Another social approach within communities is to cheer and encourage each other in chats or online forums. Social attention can also be achieved within role playing scenarios or skill checks. Discussions on social media can activate social norms that may support sustained goal striving. Often overlooked social game features are team events, shared resources and interdependent roles [15].

2.3. Game design for specific target groups

Conventional communication campaigns use motivational slogans that differ depending on the target group. But gamified advertisements and products should also be adapted to the specific target group. An advantage of gamification is that

for different contexts suitable game elements can be tailored to the consumer.

There is a need for adaptive and personalized gamification designs in a variety of applied contexts [16]. To make gamification successful, it should be personalized to the individual goals and preferences of the consumer [17]. For each campaign, there is a need to employ the elements that are most useful for the specified target group, but also most suitable for the desired media communication and corresponding product.

For example, personal experiences, such as the prior experience with games, was found to be beneficial for the understanding and enjoyment of gamified advertisements [1]. More specifically, gaming experience was positively associated with a focus on extrinsic incentives in the gamified product. This could also be the result of a longer training process in game playing, such that users learn the rules and check their earned points more frequently [3, 8].

Of practical relevance is the finding that the experience with games was associated with a higher perceived control of gamified products [1]. Gamified designs may lead to higher perceived control because games are based on rules and norms that can be acquired with training [18].

With demographic data, marketing communication can be targeted, for example, at young consumers. When looking at demographics of the target groups, the age of the consumer had a significant effect on the perception of gamification [1, 19]. Older consumers reported lower buying intentions of the gamified product, judged it as less useful and perceived less enjoyment and flow than the younger age group [1]. In another study, the acceptance of ambient assisted living environments for older users was related to the belief in making the game a habit, to envision using an exercise game on a regular basis [19]. Strengthening the belief in successful habituation when using gamification would increase the perceived health of the users [3]. Furthermore, older users might be highly motivated by social features, in particular by role models [19].

In sum, gamification might be most suitable for marketing campaigns targeted toward younger age groups with prior gaming experience [1]. For older target groups, non-game elements, such as the quality of a product and the subjective norm or perceived control in offline environments could be more important and, thus, should not be replaced by gamified designs.

3. Personal goal pursuit in consumer psychology

Personal goals can be self-set, but also activated by the consumption environment, such as features at the point of sale [13]. Consumers typically follow multiple goals [11] and need to self-regulate their focus and attention when interrupted during goal pursuit or distracted while multi-tasking [12].

To be motivating, a goal needs to have a subjective value or be of high priority for a person. If it is perceived as achievable and is associated with positive consequences, the possibility that someone is motivated to plan and initiate appropriate actions is quite high. To enable this, gamified applications can be designed to activate goals and comparison standards [15]. For instance, it is important that communication campaigns inspire the personal goals of the consumer for fantasy, inspiration and connectedness with others.

In their studies, Hamari and Koivisto [4, 20] aimed to investigate which factors motivate people to use gamified applications in the fields of physical training and sports. In their research they showed that in particular conditions of flow experience [5] were most influential, including clear and specific goal-setting, providing continuous feedback on goal pursuit, action control and appropriate challenges.

Technologies, such as apps or digital platforms may offer the opportunity for goal-setting by generating daily training plans and suggestions for individual performance levels [2, 3]. They can also provide assistance during goal pursuit with automatic reminders and calendar entries for users. Thus, game designs may offer cues and feedback to enhance the users' self-regulation in critical domains [21].

The advantage is that gamification as a technological tool may not evoke the reactance and resistance people hold against conventional instructions, as the playful design is experienced as positive in supporting goal pursuit.

3.1. Stimulating self-regulation with technology

During times of digitalization, goal-setting and self-regulation of the user gains importance in consumption and service settings. In online environments, the users need to be motivated to

perform self-regulated behaviors, and technology may support them in their goal striving efforts [2]. Educational self-regulation also gains importance for lifelong learning across the lifespan [21] and could be enriched by gamified designs.

Gamification is particularly useful to make service material appear more relevant in routine situations where users need stimulation. As a practical example, gamification can be employed in boring contexts to raise engagement in e-learning [22]. Depending on their design, game elements can focus on learning and knowledge acquisition, but also on motivating task performance as a final goal. In sales management, goal-setting instructions can be embedded within a digital platform and direct the users' attention when searching for information. Feedback on goal progress can be more effective for the user if game elements enable continuous monitoring and self-regulation [12, 21].

Furthermore, it is expected that motivational instructions create a positive climate for the user. Bittner and Zondervan [2] demonstrated that digital platforms can display motivating instructions and corresponding pictures in line with activated goals. This was shown to lead to a positive emotion and perception of a website [2].

3.2. User experience in human-technology-communication

User Experience (UX) describes the positive perception of a user before, during and after using a specific product [2, 23]. This includes the ease of use and the subjective affective feeling during the use of a software, technology or product [24]. UX can be assessed with psychological instruments testing for positive affect, need fulfillment, product perception or buying intentions [23].

If a game design is implemented to fulfill consumer goals it may induce positive emotions with a product or marketing campaign [2, 24]. This was found to result in enhanced UX and also hedonic quality of assistive technologies, in this case advanced driver assistance systems [23].

Environmental cues, such as motivating pictures may enrich the marketing communication and activate consumer goals [2]. Motivational pictures can be presented with congruent slogans on digital platforms to induce a positive UX. This can be used in digital marketing and advertising, for example via pop-up windows on websites [2].

To foster a positive UX, the design of a gamified advertising can also emphasize specific functions of a product. For example, users tend to focus their attention and adjust their behavior more to their achieved outcome scores rather than the frequency of their behavior, if this is what is reported by the gamified design [3].

A positive UX, thus, can be the result of a feedback environment providing continuous rewards when interacting with a product during goal striving. This can be crucial to strengthen buying intentions in the first place, but also to make the use of a product and the interaction with technology more satisfying [23, 24].

3.3. Feedback effects in game design

In his theory, Festinger [25] describes that people compare themselves to others to gain relevant information about themselves within a continuous comparison process. As an important game mechanism, social functionalities to compare with friends can be embedded into social media applications. Using game elements could help motivate people to show intended behaviors, such as when users compare themselves with prior quantitative results or by comparing with other users [26, 27].

On the one hand, games can set single or multiple goals to be achieved by the user. On the other hand, there are specific rules and norms implemented into the game design [18] on how these goals can be achieved. There can be a feedback mechanism implemented within the game that provides information on the progress of goal pursuit and benefits on the users' achievements [15]. If feedback is monitored in live games and challenges, self-regulation can continuously be adapted by the user [21]. Using virtual reality, consequences can be simulated and learning from mistakes takes place – if possible even in real-time.

There can also be a competition suggested between users for certain outcomes, challenges or achievements within the game [3, 8, 27]. Depending on the game mechanics and architecture, cooperation or competition might show potential, even if taking place online [8]. The interesting question is whether it is more motivating for users to cooperate or compete? Although competition may sometimes lead to higher performance, most companies nowadays

value collaboration and emphasize cooperation in their marketing strategy [28].

Gamification can be used to stimulate cooperation goals when people interact with others [29]. This can be implemented in a gamified design by embedding instructions and slogans highlighting cooperative goals towards other people, such as building a team and working together [11, 29]. This also includes social feedback from other users when working together, as in quizzes or crowdsourcing in digital environments.

Assuring social involvement or providing social support can also help users cope with distractions and interruptions during task performance [12]. Social comparisons can be employed in digital marketing to connect consumers to support each other, give recommendations on products and work towards a common goal [11]. Moreover, it has been demonstrated that multiplayer online games can stimulate learning and also solving scientific problems [30].

Most importantly, game elements may stimulate self-regulation and goal pursuit by highlighting content as relevant. Hamari and Koivisto [31] reported that the motivation of users can be influenced in a positive way by replacing long-term goals in gamified applications by short-term or sub-goals that can be achieved faster and easier. In addition, accomplishing sub-goals is rewarded with points, badges or progress bars, which again aim to increase and maintain the motivation.

The finding that progress bars, badges and points/levels are the highest ranked gamification functions is consistent with prior studies from Hamari and Koivisto [4, 20] who pointed out that these elements provide continuous feedback. This has consequences for the implementation of important regulatory elements in applied designs, as we outline next.

4. Practical examples in innovation management

Gamification can assist with finding and creating innovative solutions and support unconventional thinking. It can foster collaboration by activating cooperation goals, and critical thinking by providing situational cues to the user [11]. For marketing, it offers additional possibilities to present a new product with many details and appealing facets than conventional

media [1]. In performance settings, goal pursuit can be enhanced by tracking accomplishments, as with completed service material or the tracking of health information [3, 31]. But game elements can also be used to reward innovative marketing communication and the creativity of marketers [11]. To stimulate novel ideas, intuitive mindsets and creative decision making can be supported when using gamification in innovation management.

In digital marketing, the attitudes towards an advertisement and the perceived usefulness of a gamified product were found to be significant predictors for buying intentions [1]. On the consumer side, Hamari and Koivisto [4] found indications for novelty effects of gamified applications with new products. They showed that gamification can trigger and increase motivation and new behaviors when interacting with innovative products, but that this might be more a short-term effect of novelty. Over time, this motivation might fade if consumers interact with a product or technology on a regular basis. In this case, it could be recommended to implement additional design features that make routine behaviors interesting again [22]. New gamified material could be provided as an extra link on websites or apps, for example when consumers follow long-term goals to maintain sustained sports and physical activity [3].

4.1. EHealth: Apps supporting self-regulation

Wellmann and Bittner [3] illustrated the influence of app design on self-regulation and motivation in public health. They examined the effect of game elements in sports apps on actual running behavior. In a pre- posttest study they compared two training groups using either a gamified running app or a non-gamified app for three weeks. One key finding of the study was that the group with the gamified app achieved a significantly higher increase in the running distance than the non-gamified app group. In addition, they rated the gamified app to be more motivating compared to the non-gamified app, being supportive for their running performance. More specifically, progress bars, badges, points and levels as well as rankings were perceived as motivating. These results demonstrate that specific game elements in apps can trigger and increase motivational and behavioral goal striving over a longer period of time.

This illustrates the importance of gamified apps in eHealth, as human-technology-communication can activate goals and stimulate actual health behaviors. It can be concluded that gamification technology can easily be implemented into app designs [3]. This extends findings that evoking a positive UX when interacting with technology can foster more adherence with health recommendations than direct slogans in conventional marketing campaigns [23].

4.2. Boosting innovation in digital marketing

Research has shown that it is possible to stimulate innovation by employing motivational instructions for goal-setting [11]. These communication tools could also be enriched by gamified designs that assist marketers in pursuing their innovation goals. For example, game characters and challenges could be used to emphasize imagination and fantasy for developing novel products. With avatars and storylines as a creativity technique, marketers could be stimulated to generate new ideas. Goal-setting and feedback by the technological and social environment may encourage innovation management and assist to improve projects.

Huizinga argued that play is a free activity [18]. Users behave in games in a way they would normally not do [32]. Marketers could use game environments as a staging ground to practice new performances. Features from virtual reality can be used to simulate innovative outcomes and test their success probability along with the concrete implementation of creative ideas. Gamification can then be a tool to explore a virtual reality without the usual fears of avoiding mistakes and real-world consequences [12]. This supports learning new things and developing problem solving skills in situations where creativity is important.

With avatars, skill checks and role playing, marketers can practice to include diverse perspectives in their mindsets and elaborate on different strategic scenarios. In innovation management, they can even practice online idea generations together, or involve consumers to integrate their ideas in the early phases of the innovation process and branding [8].

An aim of gamification should, consequently, not be that users simply collect extrinsic rewards on their learning and success rates [1, 10, 31].

Instead, non-linear and divergent thinking can be emphasized in games and with game-like characters that make it easier to develop and generate ideas than in the real world. Game elements supporting intuition instead of rationality [13] could be implemented and may also activate goals for more originality [11]. By giving marketers a space to explore their innovative potential in a feedback environment supporting goal striving and rewarding achievements, this may provide opportunities to experiment.

4.3. Outlook: Artificial intelligence in real-time game play

Nowadays, games and digital platforms are oftentimes designed with real-time feedback systems. This can be provided within live games, and also with multiplayer games online. Such components within games can use artificial intelligence, which is typically based on neuronal networks or learning algorithms.

Monitoring real-time performance has the advantage that the platform can adapt the difficulty of levels and feedback to the skills of the user and thus provide adequate and appropriate challenges. It can also offer help in digital environments by providing direct assistance when problems or setbacks occur.

Dynamic components with artificial intelligence have the disadvantage for the seller that they are quite expensive to program. Furthermore, it is time-consuming to maintain a real-time environment that is always up-to date. In addition, these processes slow down the system significantly, using up bandwidth and making tablets and smartphones rather slow.

Despite these setbacks of the use of artificial intelligence, gamified instructions could contribute to a successful live streaming experience. From a goal-setting perspective, real-time design elements may offer many additional assets. It would make it possible to assess meta-cognitions of the user, such as epistemic beliefs and metacomprehension during learning and performance [21]. This would enable the real-time modeling of goal progress and even the optimization of self-regulation and coping skills directly during goal pursuit [12]. By providing immediate feedback, such platforms may enrich not only goal activation, but also lead users to achieve goal completion in the end of the self-regulatory process.

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6. References

- [1] J. V. Bittner, J. Schipper, Motivational effects and age differences of gamification in product advertising, *Journal of Consumer Marketing*, 31(5) (2014) 391-400. doi:10.1108/JCM-04-2014-0945.
- [2] J. V. Bittner, R. Zondervan, Motivating and achievement-eliciting pop-ups in online environments: A user experience perspective, *Computers in Human Behavior* (2015) 449-455. doi:10.1016/j.chb.2015.04.015.
- [3] C. Wellmann, J. V. Bittner, Gamification-Elemente bei Apps zur Bewegungsförderung, *Wirtschaftspsychologie* 18(4) (2016) 28-39.
- [4] J. Hamari, J. Koivisto, Demographic differences in perceived benefits from gamification, *Computers in Human Behavior*, 35 (2014) 179-188. doi:10.1016/j.chb.2014.03.007.
- [5] M. Csikszentmihalyi, *Flow: The psychology of optimal experience: Steps toward enhancing the quality of life*, Harper Collins Publishers, New York, 1991. doi:10.1080/00222216.1992.11969876.
- [6] G. Zichermann, C. Cunningham, *Gamification by design. Implementing game mechanics in web and mobile apps*, Beijing: O'Reilly Media, 2011.
- [7] J. Cechanowicz, C. Gutwin, B. Brownell, L. Goodfellow, Effects of gamification on participation and data quality in a real-world market research domain, in: *Proceedings of Gamification*, 2013, pp. 58-65. doi:10.1145/2583008.2583016.
- [8] M. Witt, C. Scheiner, S. Robra-Bissantz, Gamification of online idea competitions: Insights from an explorative case, *Informatik*, 11 (2011) 1-15.
- [9] Y. Liu, T. Alexandrova, T. Nakajima, Gamifying intelligent environments, in: *Proceedings of the 2011 international ACM Workshop on Ubiquitous Meta User Interfaces*, ACM, New York, 2011, pp. 7-12. doi:10.1145/2072652.2072655.

- [10] E. L. Deci, R. M. Ryan, *Intrinsic motivation and self-determination in human behavior*, Plenum Press, New York, 1985. doi:10.1007/978-1-4899-2271-7.
- [11] J. V. Bittner, M. Bruena, E. F. Rietzschel, Cooperation goals, regulatory focus, and their combined effects on creativity, *Thinking Skills and Creativity* 19 (2016) 260-268. doi:10.1016/j.tsc.2015.12.002.
- [12] J. V. Bittner, Goal interruptions and task performance: The additional influence of goal orientations, *Learning and Motivation* 76 (2021) No. 101768. doi:10.1016/j.lmot.2021.101768.
- [13] J. A. Bargh, The hidden life of the consumer mind, *Consumer Psychology Review*, 5(1) (2022) 3-18. doi: 10.1002/arc.1075.
- [14] M. Sailer, J. Hense, H. Mandl, M. Klevers, Psychological perspectives on motivation through gamification, *Interaction Design and Architecture(s) Journal*, 19 (2013) 28-37.
- [15] J. Krath, L. Schürmann, H. F. Von Korflesch, Revealing the theoretical basis of gamification: A systematic review and analysis of theory in research on gamification, serious games and game-based learning, *Computers in Human Behavior*, 125 (2021) 106963. doi:10.1016/j.chb.2021.106963.
- [16] S. Schöbel, M. Schmidt-Kraepelin, A. Janson, A. Sunyaev, Adaptive and personalized gamification designs: Call for action and future research, *AIS Transactions on Human-Computer Interaction*, 13(4) (2021) 479-494. doi:10.17705/1thci.00158.
- [17] D. Liu, R. Santhanam, J. Webster, Toward meaningful engagement: A framework for design and research of gamified information systems. *MIS Quarterly*, 41(4) (2017). DOI: 10.25300/MISQ/2017/41.4.01
- [18] J. Huizinga, *Homo Ludens. The Beacon Press*, Boston, 1955.
- [19] P. Brauner, A. Holzinger, M. Ziefele, Ubiquitous computing at its best: Serious exercise games for older adults in ambient assisted living environments – a technology acceptance perspective, *EAI Endorsed Transactions on Serious Games*, 1(4) (2015) 1-12. doi:10.4108/sg.1.4.e3.
- [20] J. Hamari, J. Koivisto, Why do people use gamification services, *International Journal of Information Management*, 35 (2015) 419-431. doi:10.1016/j.ijinfomgt.2015.04.006.
- [21] J. V. Bittner, C. Stamoov-Roßnagel, U. M. Staudinger, Educational self-regulation competence: Toward a lifespan-based concept and assessment strategy, *International Journal for Educational and Vocational Guidance* (2022). doi:10.1007/s10775-021-09491-2.
- [22] C. I. Muntean, Raising engagement in e-learning through gamification, in: *Proceedings 6th International Conference on Virtual Learning ICVL*, 2011, pp. 323-329. doi:10.12681/icodl.640.
- [23] J. V. Bittner, H. Jourdan, I. Obermayer, A. Seefried, User experience and hedonic quality of assistive technology. In: B. Weyers & A. Dittmar (Hrsg.), *Mensch und Computer 2016 – Workshopband*. Aachen: Gesellschaft für Informatik e.V., 2016. doi:10.18420/muc2016-ws02-0001.
- [24] M. Hassenzahl, S. Diefenbach, A. Göritz, Needs, affect, and interactive products - Facets of user experience, *Interacting with Computers*, 22(5) (2010) 353-362. doi:10.1016/j.intcom.2010.04.002.
- [25] L. Festinger, A theory of social comparison processes, *Human Relations*, 7(2) (1954) 117-140. doi:10.1177/001872675400700202.
- [26] B. Medler, B. Magerko, Analytics of play: Using information visualization and gameplay practices for visualizing video game data, *Parsons Journal for Information Mapping*, 3(1) (2011) 1-12.
- [27] P. Vorderer, T. Hartmann, C. Klimmt, Explaining the enjoyment of playing video games: The role of competition, *Proceedings of the Second International Conference on Entertainment Computing* (2003) 1-9. doi:10.1145/958720.958735.
- [28] M. Riar, Using gamification to motivate cooperation: A review, in: *International Conference on Information Systems (ICIS)*, Hyderabad, India, 2020.
- [29] J. Thom, D. Millen, J. DiMicco, Removing gamification from an enterprise SNS, in: *Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work*, 2012, pp. 1067-1070. doi:10.1145/2145204.2145362.
- [30] S. Cooper et al., Predicting protein structures with a multiplayer online game. *Nature*, 466 (7307) (2010) 756-760. doi:10.1038/nature09304.
- [31] J. Hamari, J. Koivisto, Working out for likes: An empirical study on social influence in exercise gamification, *Computers in Human*

Behavior, 50 (2015) 333-347.
doi:10.1016/j.chb.2015.04.018.

- [32] A. Falassi, Festival: Definition and morphology. In: A. Falassi (Ed.), Time out of time. Albuquerque: University of New Mexico Press, 1987, pp. 1-10.