

Psychological Perspectives on Motivation through Gamification

Michael Sailer¹, Jan Hense², Heinz Mandl¹ and Markus Klevers³

¹Ludwig-Maximilians-Universität München, Empirical Education and Educational Psychology, Leopoldstr. 13, 80802 Munich, Germany

²Justus-Liebig-Universität Gießen, Higher Education Learning and Evaluation, Otto-Behagel-Str. 10F, 35394 Gießen, Germany

³Technische Universität München, Institute for Materials Handling, Material Flow and Logistics, Boltzmannstr. 15, 85748 Garching, Germany
michael.sailer@psy.lmu.de

Abstract. Gamification is an innovative approach to foster motivation. It refers to the use of game elements in non-game contexts. This article adopts a differentiated view on the topic of gamification and investigates, how and why different game elements can address different motivational mechanisms. At first, the concept of gamification and specific game elements characteristic of gamification are described. After that, different motivational perspectives were analyzed and motivational mechanisms in form of effect hypotheses were derived from these perspectives. To investigate the motivational pull of gamification, game elements are matched with motivational mechanisms. Our theoretical inquiry shows that gamification potentially addresses motivational mechanisms and thereby fosters motivation. These theoretical results can be used for the effective design of gamification environments and represent a basis for empirical research. Further research is required to confirm these theoretical findings.

Keywords: gamification, motivation, game elements, psychological perspectives, motivational mechanisms

1 Introduction

When watching players playing games – especially video games – it is evident that the motivational and emotional involvement during playing can be immense [1]. The basic idea of gamification is to use this motivational power of games for other purposes not solely related to entertaining purposes of the game itself. This idea originally coming from marketing spread to different contexts involving business [2] and education [3]. Gamification environments are currently used with aims as diverse as influencing environmental behavior, motivating for physical workout, fostering safe driving behavior, or enhancing learning in schools and training. The increasing awareness level of such gamification environments led to scientific investigations mostly originating from the fields of media science and business. Though

gamification is often supposed to be an effective instrument to foster motivation [2-5], research and investigations about the motivational pull of gamification from a psychological perspective is scarce.

The aim of this article is to adopt a differentiated view on the topic of gamification and to analyze single game elements used in gamification by investigating the motivational mechanisms they try to address. Thereby the motivational pull of exemplary game elements will be explained from a psychological perspective. This article provides a basis for psychological research and design guidelines for application of gamification in practice by adopting a psychological approach on gamification.

In the upcoming section, the basic concept of gamification will be presented and different elements used in gamification will be highlighted (section 2). After examining different psychological perspectives on motivation, motivational mechanisms will be derived from these perspectives (section 3). Different game elements and motivational mechanisms will be combined and discussed in the following chapter (section 4). In the last section implications for further research on the topic of gamification will be outlined (section 5).

2 Gamification as an Innovative Approach to Foster Motivation

The principle to apply elements from games in another context and use them for other purposes is not an entirely new invention by gamification designers or researchers. Similar approaches can be observed in loyalty programs like frequent-flyer programs or bonus programs from credit card providers, who take quite a similar approach. Although gamification has been used in different contexts and some applications seem to have positive effects regarding motivation and learning [6, 7], there is a lack of theoretical underpinnings and empirical research regarding the motivational effects of gamification. Yet a concept of gamification has been described and game elements used in gamification have been identified. Accordingly, in the following section a definition of gamification with its four components will be introduced.

2.1 The Concept of Gamification

Conceptually gamification can be defined as “the use of game design elements in non-game contexts” [8]. Taking a closer look at the definition, four components are of importance:

1. The term *game* is usually understood to imply the following situational components: a goal, which has to be achieved; limiting rules which determine how to reach the goal; a feedback system which provides information about progress towards the goal; and the fact that participation is voluntary [5].
2. The term *element* helps to distinguish the concept of gamification from serious games, which describe full-fledged games for non-entertainment purposes [9]. Gamification on the other hand refers to the explicit use of particular elements of games (cf. section 2.2.) in non-gaming contexts.

3. The term *design* refers to the use of game design instead of game-based technologies or practices of the wider game ecology [9].
4. As stated before, the area of application of gamification is very broad. To take account of that and to prevent limiting the definition to certain contexts, the area of application is just described by the term *non-game-contexts* [8].

This working definition with its related components is very broad. It helps to distinguish gamification from other concepts related to gaming and provides a basis for investigations without constricting the phenomenon. Though gamification is mostly associated with digital technology, gamification is not solely related to digital media. Non-digital realizations are possible as well [8].

In the next section, different forms of gamification will be discussed by presenting exemplary elements used in gamification.

2.2 Game Elements

The main ingredients of gamification are game elements, which describe the specific and characteristic components of games that can be applied in gamification [2]. There have been different attempts to create lists of those game elements, which can be applied in gamification [2, 3, 4, 10]. Starting with a triad of points, badges and leaderboards, which can be described as very typical game elements within gamification, Werbach and Hunter [2] provide different levels of abstractions of elements. They distinguish between *dynamics*, which constitute the big picture aspects, *mechanics*, which describe the basic processes, and *components*, which are specific instantiations of dynamics and mechanics [2]. Other authors provide detailed lists of elements with their functions in various gamification settings [10]. Kapp [3] lists typical game elements like goals, rules conflict, competition, cooperation, time, reward structures, feedback, levels, storytelling, curve of interest and aesthetics. All these attempts should help to grasp how diverse game elements could possibly look like, but they should be understood as non-exhaustive lists. The different authors follow distinct strategies for their attempts to create such lists. One is to create liberal sets of elements found in any game. Another strategy is to provide a constrained set of elements, which are unique to specific games. By providing lists of elements which are characteristic to most games and which play an important role in gameplay is an attempt to meet both strategies [2, 9].

Typical game elements, which will be discussed in this article, are points, badges, leaderboards, progress bars, performance graphs, quests, meaningful stories, avatars and profile development. These elements can be found on a surface level and can in most cases be described as components:

1. *Points* can be accumulated for certain activities within the gamification environment.
2. *Badges* are visual representations of achievements, which can be collected within the gamification environment.
3. *Leaderboards* are lists of all players, usually ranked by their success.
4. *Progress bars* provide information about the current status of a player towards a goal.

5. *Performance graphs* provide information about a players' performance, compared to previous performance.
6. *Quests* are little tasks, players have to fulfil within a game.
7. *Meaningful stories* players live through within gamification.
8. *Avatars* are visual representations a player can choose within gamification.
9. *Profile development* refers to the development of avatars and attitudes belonging to such avatars.

All these elements fulfill different functions. Before these functions will be described and linked to motivational pull of each element, an overview of psychological perspectives on motivation will be introduced in the next section. Thus motivational mechanisms will be derived from each perspective, which will be linked to above mentioned elements.

3 Perspectives on Motivational Mechanisms within Gamification

Motivation refers to psychological processes that are responsible for initiating and continuing goal directed behaviours [11]. Within motivational research, different attempts have been undertaken to explain direction, persistence and intensity of certain behaviour [12].

In motivation research *six principal perspectives* can be differentiated, which can become relevant within gamification: the trait perspective, the behaviourist learning perspective, the cognitive perspective, the perspective of self-determination, the perspective of interest [13] and the perspective of emotion [14]. These perspectives do not necessarily contradict each other, but they concentrate on different components, which become relevant in different degrees depending on the focus of the perspective [13].

What can we actually learn from these perspectives on motivation? Each perspective provides implications for practice. As we are interested in how different game elements could motivate in given situations, these perspectives have to be analyzed precisely in a process-oriented way. Therefore motivational perspectives were examined for motivational mechanisms, which potentially could be addressed by certain game elements. These motivational mechanisms are described as basic effect hypotheses. After a short description of the perspective itself, hypotheses will be formulated within the context of gamification:

1. From a *trait perspective* general classes of motives and needs can evoke motivation. These motives are conceptualized as individual characteristics, which are relatively stable over time and contexts and have a strong influence on behaviour. Important motives in this perspective are achievement motive, need for power, and need for affiliation [15, 16]. So given the three most prominent motives, three motivational mechanisms can be derived from this perspective:
 - a) Players with a strong achievement motive are likely to be motivated if gamification emphasizes achievement, success and progress.

- b) Players with a strong power motive are likely to be motivated if gamification emphasizes status, control and competition.
 - c) Players with a strong affiliation motive are likely to be motivated if gamification emphasizes membership.
2. From a *behaviourist learning perspective*, motivation results from past positive and negative reinforcements, which influence the probability of future behaviour. Motivation is seen as the result of previous experiences, which typically consist of previously composed stimulus-response bonds [17]. Performance-related immediate feedback is a central mechanism for motivation:
- a) Players are likely to be motivated if gamification provides immediate feedback in form of positive and negative reinforcement.
 - b) Players are likely to be motivated if gamification offers rewards.
3. The *cognitive perspective* describes motivation as the result of means-ends analyses. These so called expectancy x value models postulate that motivation is dependent upon situation-specific goals, expectancies regarding the outcome of one's action or the situation itself, expectancies regarding the consequences of the outcome and the subjective value of these consequences [18, 19]. Thus internal processes, such as expectancies, estimations, and assessments, play a major role in cognitive theories of motivation. Another focus of such theories is goal orientation, which can be influenced by situational variables. Performance orientation and mastery orientation can be differentiated [11]. While performance orientation refers to exceeding certain standards of peers, mastery orientation refers to self-defined standards and can foster learning and intrinsic regulation of motivation [11]. Motivational mechanisms within this perspective address goals, expectancies, values of consequences:
- a) Players are likely to be motivated if gamification provides a clear and achievable goal.
 - b) Players are likely to be motivated if gamification highlights the resulting consequences of a goal.
 - c) Players are likely to be motivated if gamification emphasizes the importance of a persons' action within a given situation.
 - d) Players are likely to be motivated if gamification fosters mastery orientation regarding goals.
4. The *perspective of self-determination* focuses on the social-contextual conditions that facilitate versus forestall motivational processes. Self-determination theory postulates three universal psychological needs for competence, autonomy, and social relatedness [20]. The fulfilment of these needs is especially relevant for fostering intrinsic motivation, which is a desired motivational state. Intrinsic motivation is defined as the wish or tendency to execute an action for its own sake, for example because of its interesting, challenging or exiting nature [21]. The reasons for executing the task are lying in the task itself [22]. The integration of extrinsic motivation can be addresses by fulfilling these needs as well [23].

Correspondingly to that theory motivational mechanisms target these universal psychological needs:

- a) Players are likely to be motivated if they experience the feeling of competence.
 - b) Players are likely to be motivated if they experience the feeling of autonomy.
 - c) Players are likely to be motivated if they experience the feeling of social relatedness.
5. The *perspective of interest* takes individual preferences and content aspects in account. Researchers constitute interest as a motivational variable that is content specific and evolves in interaction with the environment. Hereby interest is both a affective and cognitive variable [24]. From this perspective motivation results from the relation of a person and the subject matter of a task or environment. In an ideal constellation this can lead to the complete immersion of a person within a task, which is called the feeling of flow [25]. Motivational Mechanisms address interest and flow:
- a) Players are likely to be motivated if gamification meets the players' interests and sparks interest for the situational context.
 - b) Players are likely to be motivated if gamification enhances the feeling of flow by providing direct feedback.
 - c) Players are likely to be motivated if gamification enhances the feeling of flow by providing a clear goal.
 - d) Players are likely to be motivated if gamification enables the feeling of flow by adapting the level of difficulty to ones' individual skills and competences.
6. The *perspective of emotion* focuses on the roles of emotions in cognitive and motivational processes. Emotions interact with these cognitive and motivational processes and can be influenced by instructional strategies. Research tries to outline implication for the emotional design of instruction [14]. Basic strategies, which can be used within that approach, are described as motivational mechanisms:
- a) Players are likely to be motivated if gamification decreases negative feelings like fear, envy, and anger.
 - b) Players are likely to be motivated if gamification increases positive feelings like sympathy and pleasure.

The described perspectives should not be seen as contradicting views on motivation and motivational design. They just focus on different aspects. For the subject of gamification motivational mechanisms have two functions: They can be used to inquire the motivational pull of game elements and they should be considered for designing motivating gamification environments. In the next section, these insights from motivational psychology will be adapted to gamification.

4 Matching Motivational Mechanisms and Game Elements

After game elements and motivational mechanisms have been introduced, the question arises, which motivational mechanisms can be addressed by certain game elements. The answer to this question could be given by providing a sophisticated matrix with game elements listed in the rows and motivational mechanisms listed in the columns. Thereby the different motivational functions of game elements would become visible. As such a matrix would exceed the scope of this article, selected game elements (cf. section 2.2) will be analyzed and matched with the motivational mechanisms (cf. section 3) they primarily trigger.

1. *Points* are very basic game elements. Although they seem to be very simple at a first glance, they can address motivational mechanisms mostly referring to a behaviourist learning perspective. The primary mechanisms are the following:
 - Points function as immediate positive reinforcements (cf. mechanisms 2a and 5b).
 - Points can be seen as mostly virtual rewards, provided for executed actions (cf. mechanism 2b).
2. *Badges* are visual representations of achievements. Such badges systems can take different levels of complexity. Main motivational mechanisms addressed by badges are the following:
 - Badges fulfill the players' need for success and thereby address people with a strong power motive (cf. mechanism 1b).
 - Badges work as virtual status symbols and thereby address people with a strong power motive (cf. mechanism 1b).
 - Badges function as a form of group identification by communicating shared experiences and activities [26] and thereby address people with a strong affiliation motive (cf. mechanism 1c).
 - Badges also have a goal setting function (cf. mechanisms 3a and 5c).
 - Badges can foster the players' feeling of competence (cf. mechanism 4a).
3. *Leaderboards* provide information about a players' success. Regarding motivation, this element can be seen critical, as only some people will stand on top of such leaderboards, while most of the other players will end up – presumably demotivated – at the bottom. Nevertheless leaderboards can also address certain mechanisms and if designed as team-score displays, they could show some additional motivational effects.
 - Individual leaderboards foster competition and address achievement and power motives (cf. mechanisms 1a and 1b).
 - For players at the top of leaderboards, feelings of competence can arise (cf. mechanism 4a)
 - leaderboards, which provide a team-score, can foster the team members feelings of social relatedness, as they emphasise collaboration and community activities provided by shared goals and opportunities for shared experiences (cf. mechanisms 4c).

4. *Progress bars* and *performance graphs* each focus on individual players and their progress. While progress bars symbolize progression towards a goal, performance graphs furthermore compare the individual scores to previously achieved scores. The following mechanisms are activated:

- Both progress bars and performance graphs provide feedback (cf. mechanism 5b).
- Progress bars provide clear goals (cf. mechanisms 3a and 5c)
- Performance graphs compare players' performance to previous performances and thereby focus on improvement and foster a mastery orientation regarding goals (cf. mechanism 3d).

5. *Quests* are little tasks, which usually show a person the directly linked rewards. This fosters the transparency of a possible success of action. Thus following motivational mechanisms are primarily addressed:

- Quests provide clear goals (cf. mechanisms 3a and 5c).
- Quests highlight resulting consequences of a goal (cf. mechanism 3b).
- Quests emphasize importance of a players' action within a given situation (cf. mechanism 3c).

6. *Meaningful stories* are often wrapped around certain activities. These stories primarily activate the following mechanisms:

- Stories can meet the players' interest and spark interest for the situational context (cf. mechanism 5a).
- By offering a variety of stories and meaningful choices within the stories, feelings of autonomy can arise (cf. mechanism 4b).
- Inspiring stories can also foster and increase positive feelings (cf. mechanism 6b).

7. *Avatars* and *profile development* relate to a player's visual representation in form of a chosen character, which can take different developmental stages. Primary motivational mechanisms are the following:

- Choices regarding the offered avatars, which are leading to different forms of gameplay, can foster feelings of autonomy (cf. mechanism 4b).
- Positive feelings and emotional bonds can arise by providing avatars and by taking a developmental progress with the avatar (cf. mechanism 5b).

Single elements can help to enhance certain feelings, like feelings of competence, autonomy and social relatedness, but these feelings tend to refer to an overall experience within the gamification environment. Also emotions rather refer to an experience, the player undergoes within gamification, than to single elements. Thus it is important to be aware of the relationship of different elements. Single elements fulfill different functions, but in interaction with each other they can have varying and complex motivational effects.

5 Conclusion and Implications

Our analysis of different theories of motivation showed, that from a theoretical point of view gamification has the potential to foster motivation in different contexts. Exemplary game elements can be linked to motivational mechanisms, found in motivational theories and research.

By matching the different motivational mechanisms with corresponding game elements, three main components stick out and become relevant when inquiring motivation through gamification or when designing gamification environments: One aspect is the *person*. It is important to inquire the target group, which will be addressed by gamification. The second aspect is the *gamification environment* itself. Hereby motivational theories offer guidelines for the effective design of such environments and help to analyze why certain game elements have a motivational pull. The third aspect is the *context*. The context can be described as the content or topic of a task or the overall situation itself. Each of these aspects has to be considered while analyzing and designing gamification environments.

From a research perspective, more empirical research should be undertaken to investigate if theoretical underpinnings can be confirmed. To get insights in the motivational pull of specific elements, experimental designs including varying game elements should help to get further insights.

Acknowledgments. Work on this paper was partly funded by the German Federal Ministry of Economics and Technology via the German Federal Logistics Association (grant no. 456 ZN).

References

1. Hense, J., Mandl, H.: Learning in or with games?: Quality criteria for digital learning games from the perspectives of learning, emotion, and motivation theory, In: D.G. Sampson, J. M. Spector, D. Ifenthaler & P. Isaias (eds.), Proceedings of the IADIS International Conference on Cognition and Exploratory Learning in the Digital Age, pp. 19-26, IADIS, Madrid (2012)
2. Werbach, K., Hunter, D.: For the Win: How Game Thinking Can Revolutionize Your Business., Wharton Digital Press, Philadelphia (2012)
3. Kapp, K. M.: The Gamification of Learning and Instruction: Game-based Methods and Strategies for Training and Education, Pfeiffer, San Francisco (2012)
4. Zichermann, G., Cunningham, C.: Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps, O'Reilly Media, Sebastopol (2011)
5. McGonigal, J.: Reality Is Broken: Why Games Make Us Better and How They Can Change the World, Penguin Group, New York (2011)
6. Domínguez, A., Saenz-de-Navarrete, J., de-Marcos, L., Fernández-Sanz, L., Pagés, C., Martínez-Herráiz, J.-J.: Gamifying learning experiences: Practical implications and outcomes, Computers & Education, 63, pp. 380--392 (2013)
7. Rughiniş, R.: Flexible Gamification in a Social Learning Situation. Insights from a Collaborative Review Exercise, Proceedings of the CSCL 2013, Munich (2013)
8. Deterding, S., S., Khaled, R., Nacke, L., Dixon, D.: Gamification: Toward a Definition, Proceedings of the CHI 2011, Vancouver (2011)

9. Deterding, S., Khaled, R., Nacke, L., Dixon, D.: From Game Design Elements to Gamefulness: Defining "Gamification", Proceedings of the MindTrek 2011, Tampere (2011)
10. Robinson, D., Bellotti, V.: A Preliminary Taxonomy of Gamification Elements for Varying Anticipated Commitment, Proceedings of the CHI 2013, Paris (2013)
11. Schunk, D.H., Pintrich, P.R., Meece, J.L.: Motivation in education: theory, research, and applications, Pearson, Upper Saddle River (2010)
12. Urhahne, D.: Sieben Arten der Lernmotivation, *Psychologische Rundschau*, 59(3), pp. 150-166 (2008)
13. Krapp, A.: Die Psychologie der Lernmotivation: Perspektiven der Forschung und Probleme ihrer pädagogischen Rezeption, *Zeitschrift für Pädagogik*, 39(2), pp. 187--206 (1993)
14. Astleitner, H.: Designing emotionally sound instruction: The FEASP-approach, *Instructional Science*, 28, pp. 169--198 (2000)
15. McClelland, D.C.: Human motivation, Cambridge University Press, Cambridge (2009)
16. McClelland, D.C.: The achieving society, Princeton, NJ, (1961)
17. Skinner, B.F.: Operant Behavior, *American Psychologist*, 18(8), pp. 503--515 (1963)
18. Heckhausen, H.: Achievement motivation and its constructs: A cognitive model, *Motivation and Emotion*, 1(4), pp. 283--329 (1977)
19. Heckhausen, J., Heckhausen, H.: Motivation and action: Cambridge University Press, Cambridge (2008)
20. Ryan, R.M., Deci, E.L.: Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being, *American psychologist*, 55(1), pp. 68--78 (2000)
21. Deci, E.L., Ryan, R.M.: Intrinsic motivation and self-determination in human behavior, Plenum Press, New York (1985)
22. Schiefele, U., Schreyer, I.: Intrinsische Lernmotivation und Lernen: ein Überblick zu Ergebnissen der Forschung, *Zeitschrift für Pädagogische Psychologie*, 8(1), pp. 1--13 (1994)
23. Deci, E.L., Ryan, R.M.: The "What" and "Why" of Goal Pursuits: Human Needs and the Self-Determination of Behavior, *Psychological Inquiry*, 11(4), pp. 227--268 (2000)
24. Hidi, S., Renninger, K.A., Krapp, A.: Interest, a Motivational Variable That Combines Affective and Cognitive Functioning, In: D.Y. Dai, R.J. Sternberg (eds.), *Motivation, emotion and cognition: Integrative perspectives on intellectual functioning and development*, pp. 89--115, Erlbaum, Mahwah (2004)
25. Csikszentmihalyi, M., Abuhamdeh, S., Nakamura, J.: Flow, In: A.J. Elliot, C.S. Dweck (eds.), *Handbook of competence and motivation*, pp. 598--608, Guilford Publications (2005)
26. Antin, J. & Churchill, E. F.: Badges in Social Media - A Social Psychological Perspective, Proceedings of the CHI 2011, Vancouver (2011)