

PSYCHOLOGY THEORIES IN GAMIFICATION: A REVIEW OF INFORMATION SYSTEMS LITERATURE

Christian Schlagenhauer, Friedrich Alexander University Erlangen Nuremberg

christian.schlagenhauer@fau.de

Michael Amberg, Friedrich Alexander University Erlangen Nuremberg

michael.amberg@fau.de

Abstract

A central aspect for the application of Gamification is to motivate desired user behavior. As motivation and behavior are discussed in psychology an understanding of psychology theories is a vital and inevitable building block in the creation of successful Gamification. This issue has already been addressed in academia and praxis by transferring psychology theories to the domain of Gamification. Yet to the best of knowledge a comprehensive overview of psychology theories for Gamification is missing. The paper at hand closes this gap and provides a comprehensive overview of psychology theories by conducting a literature review in 42 top ranking IS journals as well as IS conferences and corresponding IS streams. Results showed that a plethora of psychology theories with different use intentions were employed in the context of Gamification. All findings were first discussed within the scope of their containing article and second concept centric in table form for a better overview. Derived from the results future research outlets were identified and presented.

Keywords: Gamification, Information Systems, Literature Review, Psychology, Theory

1 INTRODUCTION

Gamification evolved to one of the most important trends in technology (Deloitte 2011). Various examples illustrate the success. Popular ones from the industry are Foursquare¹ and Nike+². Since 2011 Gartner values the importance of Gamification by incorporating the term into their Hype Cycle as an expected upcoming trend for the next five to ten years. Regarding the monetary value of Gamification, M2 Research predicts a market share of more than \$980 mio. for 2014, which is likely to grow to \$2,8 bio. by 2016 (Meloni & Gruener 2012). In 2012, 20% of Global 2000 organizations have already deployed a gamified application and by 2014 this trend is growing up to 70% (Gartner 2011). The areas in which Gamification is applied to are manifold. They range from productivity, finance, health, education, sustainability to news and entertainment (Deterding et al. 2011; Meloni & Gruener 2012). Also due to this trend in the various mentioned practical areas, Gamification is gaining more and more scientific notice, which also accounts for Information Systems (IS) with a growing number of publications. A central aspect of Gamification is to motivate desired user behavior (Thom et al. 2012). However this is more than just adding game elements and consequently Gartner predicts that 80% of gamified applications will fail due to poor design (Gartner 2012). As motivation and behavior are discussed in psychology an understanding of psychology theories is a vital and inevitable building block in the creation of successful Gamification. Academia and praxis addressed this issue and transferred various psychology theories to the domain of Gamification. The goals are amongst others to better understand as well as to improve and further develop Gamification. Yet what is missing to the best of knowledge is a comprehensive overview of psychology theories for

¹ <https://foursquare.com>

² <http://nikeplus.nike.com/plus/>

Gamification. Therefore the purpose of this paper is to close this gap and provide a comprehensive overview of the psychology theories mentioned in conjunction with Gamification from an IS perspective. This was accomplished by a literature review in 42 top ranking IS journals as well as IS conferences and corresponding IS streams.

The remainder of this paper is structured as follows. First Gamification is introduced and explained. Next the procedures for the literature review are described followed by the presentation of the findings. Last results are discussed and a future outlook is given.

2 GAMIFICATION

This section gives a short introduction of Gamification, its history and current academic definitions. Furthermore it is outlined how Gamification is understood within this paper.

Coined in the digital media industry Gamification gained widespread adoption after the second half of 2010 (Deterding et al. 2011). The origin of the phrase cannot be dated back unambiguously. Opinions diverge between its first occurrence in 2008 (Deterding et al. 2011), respectively 2002 where Pelling (2011) claims to have used the term for the first time. The first Gamification system was introduced by Bunchball³, founded in 2005. Since then more and more companies started offering Gamification solutions in various forms which first were applied for marketing purpose but soon expanded to manifold areas (Deterding et al. 2011). Trying to give Gamification a unique characterization is difficult as various understandings exist. Deterding et al. (2011) see the basic principles behind Gamification in increasing activity, retention and motivation of individuals, which is amongst other things accomplished by implementing so called game design elements in a non-game context. Huotari and Hamari (2012) alternatively see the creation of gameful experiences to support value creation as the central concepts, which can be applied not solely to a non-game context but also to games in the form of meta games. Also the term Gamification itself is discussed controversial, which leads some authors to propose different terms, for instance “productivity games” or “playful design”. Nonetheless Gamification is the most renowned.

A plethora of similar and related concepts exist which need to be distinguished from Gamification. Deterding et al. (2011) identified three major streams which are related to games namely pervasive games, the use of games in a non-game context and playful interaction (Deterding et al. 2011). These main categories inherit developments like healthgames, persuasive games, alternate reality games and many more. Within the non-game context “serious games” that represent a “full-fledged” game for non-entertainment purpose can be found (Deterding et al. 2011). This phenomenon was first mentioned by Abt (1987) and even though the non-game context applies for Gamification, serious games create an entirely new game instead of enhancing an existing system with “gamefulness” (Deterding et al. 2011; Huotari & Hamari 2012). This means that “serious games” are not considered Gamification. Besides different perceptions regarding the meaning of Gamification and its proper classification among similar concepts the question arises if Gamification describes a new and distinct phenomenon at all (Deterding et al. 2011) that is therefore worth researching. This assumption is supported by the thesis that game based aspects and concepts that Gamification relies on are not new at all. Loyalty programs and several other marketing incentives which are used for a long time already are now part of what is called Gamification (Meloni & Gruener 2012). Though what has changed are the new underlying technologies. They offer a never seen before level of communication, entertainment and interaction (Meloni & Gruener 2012). Within their paper Deterding et al. (2011) conclude that Gamification does provide a distinct phenomenon that is therefore worth researching.

Several attempts to define Gamification exist, both in industry and academia. Focusing exclusively on academic definitions, two are to be considered:

The use of game design elements in non-game contexts.

³ <http://www.bunchball.com>

(Deterding et al. 2011)

A process of enhancing a service with affordances for gameful experiences in order to support user's overall value creation.

(Huotari and Hamari 2012)

For the remaining paper the definition provided by Deterding et al. (2011) will be used as reference.

3 RESEARCH METHODOLOGY

This section outlines how the literature review was approached in detail, including the retrieval of literature and the filtering process.

3.1 IS Literature Retrieval

The literature review was initialized by first focusing on contributions in the leading international IS journals as proposed by Webster & Watson (2002). Therefore the “senior scholars' basket” of IS journals from the Association for Information Systems (AIS) was consolidated. Furthermore the top twenty of the top fifty ranked MIS journals composed by the AIS were included which already listed four of the “senior scholars' basket” of IS journals. Outlined aims and scopes of the journals were scanned first to see if valuable input could be expected. If no common ground was identified they were excluded⁴. Taking into account the novelty of the research topic major IS conferences were considered as well. The selected conferences are sponsored or affiliated by top associations in the domain of IS and therefore in accordance with the selection process for conferences provided by Levy & Ellis (2006). To broaden the insight within the scope of IS and considering its interdisciplinary nature (Webster & Watson 2002), corresponding streams of IS research were also consulted if applicable. Banker & Kauffman (2004) identified and described five different streams of IS research: *Decision support and design science, Value of information, human-computer systems interaction, IS organization and strategy, and Economics of IS and IT* by examining the development of IS in a timeframe from 1954 to 2003 and correlating the findings into top categories. While some of the research streams do not seem to have strong interrelation with the concepts of Gamification and therefore were neglected, human-computer systems interaction is of interest. The human-computer systems interaction “emphasizes the cognitive basis for effective systems design” (Banker & Kauffman 2004) and thus is related to disciplines like cognitive psychology, decision science and design science (Banker & Kauffman 2004). As one of the key aspects of Gamification are to engage and motivate users (Deterding et al. 2011) and because Deterding et al. (2011) see the origin of Gamification in this stream, human-computer systems interaction or in general HCI thus represents an additional important area to examine. Consequently high quality journals as well as conferences within the area of HCI were selected based on the same rigorousness as for IS. Journals were chosen, based on the impact factor provided by the Institute for Scientific Information (ISI). Here the five highest ranked journals acquired by a keyword search for interaction, human, interface, and user within the categories computer science or cybernetics were chosen. In addition, two more journals that are sponsored by the special interest group on human computer interaction (SIGHCI) were added. All highest ranked⁵ conferences were picked from the Excellence in Research for Australia initiative's (ERA) ranking of conferences and journals by incorporating a title search for interaction, human, interface, and user. Furthermore applicable conferences, sponsored by the SIGCHI were added to the selection.

The following list gives an overview of the included journals and conferences⁶.

⁴ This approach applied to four journals: Artificial Intelligence, AI Magazine, Decision Support Systems and ACM Transactions on Database Systems. Additionally IEEE Trans. and ACM Trans. were excluded which represent collections of journals.

⁵ This means A* and A ranked conferences.

⁶ Explanation: IS = Information Systems, Int. = International, Conf. = Conference.

Category	Source
IS Journals	“IS Basket of Journals”, Communications of the ACM, Communications of the Association for IS, Decision Science, Harvard Business Review, Information and Management, IEEE Software, IEEE Transactions on Software Engineering, Journal of Computer and System Sciences, Management Science, Sloan Management Review
IS Conferences	Americas Conf. on IS, BLED eConf., Int. Conf. on Information Resources Management, European Conf. on IS, Hawaii Int. Conf. on System Sciences, Int. Conf. on IS, Mediterranean Conf. on IS, Pacific Asia Conf. on IS, Wirtschaftsinformatik
HCI Journals	Human Computer-Interaction, Interacting with Computers: The interdisciplinary Journal of Human-Computer Interaction, Int. Journal of Human Computer Studies, Int. Journal of Human-Computer Interaction, AIS Transactions on Human-Computer Interaction, ACM Transactions on Computer-Human Interaction, User Modeling and User-Adapted Interaction
HCI Conferences	Conf. on Human Factors in Computing Systems, Computer Supported Cooperative Work, The ACM SIGCHI Symposium on Engineering Interactive Computer Systems, Int. British Computer Society Human Computer Interaction Conf., Human-Computer Interaction – INTERACT, Int. Conf. on Intelligent User Interfaces, ACM Symposium on User Interface Software and Technology, IEEE Symposium on Visual Languages and Human-Centric Computing

Table 1. List of selected Journals and Conferences.

Although research was limited to the journals and conferences listed above and consequently might leave out a large body of knowledge, still an extensive and high quality set of resources is provided. The literature review was tied to a timeframe from 2008 to 2013. Within this timeframe most of the relevant literature should be included, also considering the fact that the term Gamification did not gain popularity before 2010 (Deterding et al. 2011). On all journals and conferences a keyword search was conducted, with a stemming of the term Gamification to the actual search term gamif* in order to ensure inclusion of multiple variations of the term like (to) gamify or (being) gamified. No further restrictions e.g. adding an additional search string like the term psychology or theory were applied to ensure inclusion of as much literature as possible. Title, abstract and keyword section as well as the full body were scanned. Within this phase 78 articles were identified.

3.2 Filtering Process

All identified articles had to meet certain inclusion criteria in order to be further used.

- Criterion (1): The article is no book review, editorial, keynote, panel talk, conference summary or introduction, or a workshop description.
- Criterion (2): The article focuses on Gamification in the sense of Deterding et al. (2011). Excluded were “full-fledged” games or other similar terms like “serious games” or “persuasive games”. Furthermore only a non-game context was considered relevant.
- Criterion (3): The article presents psychology theories which are explicitly mentioned in conjunction with Gamification. Further theories of psychology which are mentioned in the article but not directly connected to Gamification were neglected.
- Criterion (4): The psychology theories are part of the actual research. Theories in introductory sections with no further explicit application or description in the main body of research were neglected⁷.

Consequently abovementioned criteria were used to examine⁸: (1) only papers, (2) which focus on Gamification, (3) that name psychology theories in a context with Gamification, and (4) actually apply

⁷ Consequently if the main body of research consists of a recapitulation of literature the findings were considered relevant.

⁸ Explanation is given in the same order as the four criteria were introduced.

these theories. The outlined criteria lead to 9 articles from the domain of IS that incorporate psychology theories in their work and directly relate these theories to Gamification.

4 RESULTS

The findings are presented in a twofold manner. To begin findings are introduced per article (author-centric). This has various reasons. First the literature review only revealed few overlapping theories among the identified articles. Consequently synthesizing the findings from the literature right away was not practical enough as there was no benefit to do so. Second several articles used a combination of theories. A concept-centric approach would have made it harder to understand the interrelation between theories, the reason for their combination as well as the intention to use certain theories in an article. Therefore first presenting the findings in an author-centric fashion seemed to be more applicable. After illustrating the applied theories in its entirety per article, additionally a concept-centric approach as recommendation by Webster & Watson (2002) is provided in table 2. The tabular form follows the intention to showcase each theory individually including its authors and the intended purpose for a psychology theory.

4.1 Author-Centric use of theories

The findings are illustrated in alphabetic order of the authors.

4.1.1 Hamari & Koivisto (2013)

In the context of a physical exercise application with social network capabilities, the authors' research model drew from the theory of *Planned Behavior* which was extended with factors from theories about *Social Influence*, *Recognition*, and *Reciprocal Benefits*, which themselves are positively influenced by the paradigm of Network Exposure. The authors hypothesized that findings from those theories positively influence the attitude and use behavior toward Gamification.

4.1.2 Kamal et al. (2013)

The authors introduced an online social network application with the intention to foster healthy behavior. *Social Cognitive Theory* was incorporated which holds that behavior is determined through incentives and expectations. Of key importance within the *Social Cognitive Theory* is the *Self-Efficacy Theory*. Furthermore *Uses and Gratifications Theory* was used to provide valuable insights on the motives to engage in online social networks. Based on the factors from *Social Cognitive Theory* and *Uses and Gratification Theory* Gamification design elements were developed.

4.1.3 Kankanhalli et al. (2012)

Self Determination Theory, *Flow* and Fogg's *Multi Factor Model* were named as motivators for online user engagement. *Social Exchange Theory*, *Social Capital Theory* and *Uses* as well as *Gratifications Theory* were also considered relevant to understand user engagement through Gamification. Furthermore it was stated that theories from specific contexts Gamification is applied to should also be considered relevant.

4.1.4 Korn (2012)

In order to improve production environments *Flow* was identified as important factor for engagement and to increase motivation as well as performance. Components of Flow (challenge, clear goals, and immediate feedback) were incorporated into a gamified application.

4.1.5 Massung et al. (2013)

Deci's Effects of Externally Mediated Rewards as well as Fogg's *Behavior Model for Persuasive Design* were examined as factors for intrinsic motivation and proved applicable. The article researched a crowdsourcing application to support pro-environmental community activism, which was enhanced with Gamification.

4.1.6 Shang & Lin (2013)

For the authors the *Means-End Theory* which has been applied to various studies in consumer-purchasing behavior offers the possibility to measure consumer preferences and attitudes toward a product and further helps to link consumers' needs and product characteristics to reveal consumers' goals and motivation to purchase a product. This theory was proposed in a setting where Gamification is used to impact purchase intentions.

4.1.7 Sjöklint et al. (2013)

The authors created a multi-theoretic research framework to analyze the impact of numerical data on user behavior in three steps. First *Self-Determination Theory* and *Self-Efficacy Theory* were employed for conceptualizing the motivation for individuals to engage in interpreting numbers. Second *Fast and Frugal Heuristics* on the cognitive act of interpreting quantitative data in order to derive an evaluative self-perception were applied which finally incorporated the *Dual Self Model* on how users behaviors are influenced by the numerical representations of their actions. Gamification in this context is seen as the motivating reward system to collect points for the aforementioned purpose.

4.1.8 Teh et al. (2013)

Self-Determination Theory was proposed as a fundamental tool to understand motivation. Focusing on games the *Theory of Intrinsically Motivating Instruction* was employed which covers three main intrinsic motivations: challenge, fantasy, and curiosity. Similarly Yee's *Player Motivation Model* summarized motivations for play into achievement, social, and immersion components. Next Bartle's *Player Classification* was mentioned as means to classify users based on their motivations to play. Furthermore the authors outlined the *Theory of Social Comparison* which posits that individuals need a reference in order to form opinions about their own abilities. Gamification is used as a means to evoke intrinsic motivation by framing tasks in ways that elicit positive attitudes.

4.1.9 Vassileva (2012)

In the article theories were divided in intrinsic, social and extrinsic motivators. Extrinsic motivation covered Skinner's *Reinforcement Theory* and *Expectancy Theory*. Intrinsic motivation considered *Needs-Based Theories* of Maslow, Alderfer's *ERG Theory*, *Acquired Needs Theory*, Bandura's *Self-Efficacy Theory* as well as *Goal Setting Theory*. Herzberg's *Two Factor Theory*, *Equity Theory* and *Cognitive Evaluation Theory* considered the interplay of intrinsic, extrinsic and social motivators. On top of the aforementioned intrinsic, social and extrinsic division Vassileva mentioned *Self-Determination Theory* and *Theory of Planned Behavior*. Furthermore new areas of social science like social psychology, educational psychology and organizational science were proposed to further explore motivation. The author's intention was to give a broad overview of approaches to motivate users to participate. As motivation plays a central part in Gamification the theories were also recommended as valuable resource for Gamification.

4.2 Concept-Centric use of theories

All identified theories and their authors are illustrated in the following matrix. Furthermore the sum of all findings per article is provided on the axis of abscissae. The sum of occurrences per theory is provided on the axis of ordinates. For each theory the overall intended purpose which was mentioned in the corresponding article(s) is provided as well. The intended purpose is provided as precise as formulated in the article. Theories which were identified in more than one article are highlighted and afterwards explained in more detail.

Theory	Author									Count	Intended Purpose
	(Hamari & Koivisto 2013)	(Kamal et al. 2013)	(Kankanhalli et al. 2012)	(Korn 2012)	(Massung et al. 2013)	(Shang & Lin 2013)	(Sjöklint et al. 2013)	(Teh et al. 2013)	(Vassileva 2012)		
Acquired Needs Theory (McClelland 1962)									•	1	Intrinsic Motivation
ERG Theory (Alderfer 1969)									•	1	Intrinsic Motivation
Player Classification (Bartle 1996)								•		1	Motivation
Cognitive Evaluation Theory (Deci 1975)									•	1	Interplay of Intrinsic, Extrinsic and Social Motivators
Effects of Externally Mediated Rewards (Deci 1971)					•					1	Intrinsic Motivation
Dual Self Model (Thaler & Shefrin 1981)							•			1	Behavior
Equity Theory (Adams 1965)									•	1	Interplay of Intrinsic, Extrinsic and Social Motivators
Expectancy Theory (Vroom 1964)									•	1	Extrinsic Motivation
Fast Frugal Heuristics (Gigerenzer & Todd 1999)							•			1	Behavior
Theory of Social Comparison (Festinger 1954)								•		1	-
Theory of Flow (Csikszentmihályi 1990)			•	•						2	Intrinsic Motivation
Behavior Model for Persuasive Design (Fogg 2009)					•					1	Behavior
Multi Factor Model (Fogg 2009)			•							1	Behavior
Goal Setting Theory (Locke & Latham 1990; Locke & Latham 2002)									•	1	Intrinsic Motivation
Two Factor Theory (Herzberg et al. 1959)									•	1	Interplay of Intrinsic, Extrinsic and Social Motivators
Hierarchy of Needs (Maslow 1943)									•	1	Intrinsic Motivation
Means-End Theory (Gutman 1982)						•				1	Behavior
Reciprocal Benefit (Preece 2001; Lin 2008)	•									1	Motivation for Participation
Recognition (Lin 2008; Cheung et al. 2011)	•									1	Behavior
Self Determination Theory (Deci & Ryan 1985)			•				•	•	•	4	Intrinsic Motivation
Self-Efficacy Theory (Bandura 1977)		•					•		•	3	Intrinsic Motivation
Reinforcement Theory (Skinner 1953)									•	1	Extrinsic Motivation
Social Capital Theory and Uses (Nahapiet & Ghoshal 1998)			•							1	Motivation for Participation
Social Cognitive Theory (Bandura 1977)		•								1	Behavior
Social Exchange Theory (Blau 1964)			•							1	Motivation for Participation
Social Influence (Kelman 1958; Ajzen 1991)	•									1	Behavior
Theory of Intrinsically Motivating Instruction (Malone 1981)								•		1	Intrinsic Motivation
Theory of Planned Behavior (Ajzen 1991)	•								•	2	Behavior
Uses and Gratification Theory (Katz et al. 1973)		•	•							2	Motivation for Participation
Player Motivation Model (Yee 2006)								•		1	Motivation
Count	4	3	6	1	2	1	4	5	12		

Table 1. Summary of the identified theories mentioned in conjunction with Gamification and their corresponding articles. Sorted in alphabetical order of theories and authors. Theories occurring in more than one article are highlighted.

4.3 Frequently used theories

In the following the most frequently employed theories and their application in the context of Gamification (identified articles were taken as base of operations) are described in more detail.

4.3.1 *Theory of Flow*

Flow represents a theory of intrinsic motivation. Csíkszentmihályi (1990), introduced the phenomenon of the so called Flow experience, which can be described as an experience that is at once demanding and rewarding. Flow is furthermore a singularly productive and desirable state of mind. Three necessary core components of an activity can be identified that lead to Flow. First a certain level of challenge needs to be reached which matches the skill set of the user. Second, an activity must have clear and bounded goals. Third, there must be immediate feedback for the user's action (Csíkszentmihályi 1990). Applied to Gamification this could mean that a user should be in a state of Flow to be fully immersed in an activity (Korn 2012).

4.3.2 *Self-Determination Theory*

Self-Determination Theory is based on “the hypothesis that there is a set of universal psychological needs that must be satisfied for effective functioning and psychological health” (Deci & Ryan 2008). Fulfilment of these needs influences the overall well-being and also the extent to which motivation becomes internalized. The core needs are defined as autonomy, relatedness, and competence (Deci & Ryan 2000). Set in the context of games (and therefore transferable to Gamification), Ryan et al. (2006) concluded that people are attracted to video games because they experience autonomy, competence, and relatedness while playing. In this scenario autonomy refers to the freedom to choose the game activity to perform and the way in which to perform the activity. Competence is defined as being able to carry out effective actions in the game. Relatedness can be seen as connection to other people through the game.

4.3.3 *Self-Efficacy Theory*

Bandura (1977) discovered that the adoption of a goal as well as the initiation of its pursuit, the amount of effort expended, and the duration of its maintenance are based on the evaluation of the extent to which the goal is easily achievable. Consequently the theory describes the personal belief of one's ability to succeed. Focusing on Gamification one can say that players will start the game if they perceive it to be within their grasp to complete and win it.

4.3.4 *Theory of Planned Behavior*

The Theory of Planned Behavior emerged to a major framework for understanding, predicting, and changing human social behavior. In the core it states that the voluntariness of carrying out a task is one of the central antecedents for attitude formation and behavior. Furthermore the attitude toward behavior, subjective norms, and perceived behavioral control, shape the behavioral intentions as well as the behaviors of an individual (Ajzen 1991). For Gamification the Theory of Planned Behavior can be of value as a source for social factors predicting attitudes and use behavior.

4.3.5 *Uses and Gratifications Theory*

Initially intended to provide a theoretical approach which defines the motivations to use traditional mass media like newspapers, radio, and television (Ruggiero 2000) this theory is now also applied to computer-mediated-communication (Richardson et al. 2010) and the internet (Papacharissi & Rubin 2000). In the context of Gamification the Use and Gratifications Theory is seen useful to explain the motives for participation in online communities.

5 DISCUSSION

The objective of this paper was to provide a comprehensive overview of psychology theories, which were directly mentioned in conjunction with the phenomenon of Gamification in IS. This was accomplished by conducting a literature review in 42 top ranking IS journals as well as IS conferences

and corresponding streams of IS. Providing an overview of psychology theories in Gamification closes a gap of research and is of high relevance as psychology theories are seen as one of the central building blocks to create successful Gamification and to understand its effectiveness.

Considering previous literature only the work of Hamari et al. (2014) could be identified. The authors conducted a literature review on empirical studies to answer the question if Gamification works. The work also provided an overview if the identified literature examined psychological and/or behavioral outcomes. Though not directly comparable to the paper at hand Hamari et al. (2014) also provided sources which deal with psychology in the context of Gamification.

Results showed that a plethora of various theories exist, mostly examining behavior in general or intrinsic motivation. Consequently the identified articles applied theories which directly refer to the overall goal of Gamification, namely to motivate desired user behavior. Articles applied their research to various contexts ranging from health (Hamari & Koivisto 2013; Kamal et al. 2013) to work (Korn 2012; Teh et al. 2013), crowdsourcing (Massung et al. 2013), and purchasing (Shang & Lin 2013). It is surprising that no paper could directly be referred to the marketing context. Even though marketing is seen as the initial context for Gamification (Deterding et al. 2011). Furthermore it could be identified that only few theories were employed in more than one of the articles. These were on the one hand Theory of Flow (intrinsic motivation), Self Determination Theory (intrinsic motivation), and Self-Efficacy Theory (intrinsic motivation). All these theories deal with initial requirements that need to be met for motivation and desired behavior to occur. Derived from this finding assumptions for Gamification in general can be made. For instance an environment (e.g. at work) should be created which gives the user the opportunity to meet these initial requirements. However one needs to consider that these requirements are individual as every user has its own initial position (e.g. skills (Flow) or competence (Self Determination Theory)). On the other hand Theory of Planned Behavior (behavior) and Uses and Gratification Theory (motivation for participation) were named more than once. With a total of 30 identified theories, consequently about 84 percent of theories were exclusively applied to just one article. Therefore one might expect to see more new theories linked to Gamification for the future. Gartner currently positions Gamification at the “Peak of Inflated Expectations” within their 2013 Hype Cycle. O’Leary (2008) stated that the position of a technology in the Hype Cycle can indicate the kind of research questions possible to ask, the information available about a technology as well as the research methods which can be applied at that certain stage. For the “Peak of Inflated Expectations” this means that there is still limited information about the technology and how it should be applied. Few (mostly prototypical) implementations are available but limited and most of the research is case-based (O’Leary 2008). In the context of the research effort at hand the results might be interpreted in the way that researchers are still searching for theories and best practice combinations of theories that can be applied to Gamification. The plethora of unique findings confirms this assumption.

This leads to future research directions. During the filtering process, the literature review revealed that some psychology theories were applied to similar but not identical contexts like “serious games”. Due to the fact that Deterding et al. (2011) was used as reference to decide if Gamification in their sense occurred, these theories were not considered. However as these concepts all have their origin in games (Deterding et al. 2011) future research could test their applicability also in the context of Gamification. Furthermore with Gamification still being in its nascent state it would be interesting to see the application of the employed psychology theories over time. For example considering the rise of best practice or state of the art psychology theories for Gamification as well as the most fruitful combination of theories. Next future research could also apply a taxonomy of the identified psychology theories with the intention to provide a structured overview. One might think of a taxonomy which maps the existing theories to the various branches in psychology. Afterwards branches which contain a high number of theories that have already been applied to Gamification might be reviewed for new and unused theories that could be of value. Another taxonomy might serve as a reference repository for psychology theories which have already been used to evoke certain behaviors. Next as Gamification is applied to a growing number of various contexts future research should also address this issue by eventually broadening the scope of analyzed IS streams. For instance

results showed that theories were frequently applied to a work context. Consequently streams that incorporate organization science and management might be of high interest as well.

This paper has limitations. First the literature research focused on academic publications, even though Gamification is also an industry driven phenomenon. Consequently the paper at hand might deliver a limited view on the topic of Gamification and corresponding theories in psychology. Second applying a stemming approach for the term Gamification could limit the view on this topic as there might be other terms that refer to the same phenomenon.

6 CONCLUSION

Several contributions were made to the scientific community. First relevant IS literature was collected, analyzed and filtered from 42 top ranking IS journals as well as IS conferences and IS streams from 2008 to 2013. Second all identified articles were scanned for their contribution of psychology theories which were mentioned in direct relation to Gamification. All the results were first presented in an author-centric approach to better illustrate interdependencies between theories and their application in Gamification. Next a concept-centric approach showcased all identified psychology theories and the articles discussing them. Most frequently used theories were presented in more detail. Therefore it is believed that this paper provides a comprehensive and valuable reference of currently employed psychology theories and accordingly closes an important gap of research. This paper can be employed to improve already existing Gamification implementations with psychology theories or provide the basis for new research activities in Gamification for both academia and praxis. Academics can build on the provided results to further analyze and deepen the theoretical foundation of Gamification and therefore to advance research. Professionals can employ the provided theories to better understand the underlying motivational and behavioral factors when dealing Gamification.

References

- Abt, C.C., 1987. *Serious Games*, Lanham, MD: University Press of America.
- Adams, J.S., 1965. Inequity in Social-Exchange. In L. Berkowitz, ed. *Advances in Experimental Social Psychology*. New York: Academic Press, pp. 267–299.
- Ajzen, I., 1991. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), pp.179–211.
- Alderfer, C.P., 1969. An empirical test of a new theory of human needs. *Organizational Behavior and Human Performance*, 4(2), pp.142–175.
- Bandura, A., 1977. Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), pp.191–215.
- Banker, R.D. & Kauffman, R.J., 2004. 50th Anniversary Article: The Evolution of Research on Information Systems: A Fiftieth-Year Survey of the Literature in Management Science. *Management Science*, 50(3), pp.281–298.
- Bartle, R., 1996. Hearts, Clubs, Diamonds, Spades: Players Who Suit MUDs. *The Journal of Virtual Environments*, 1(1).
- Blau, P.M., 1964. *Exchange and power in social life*, Transactions Publisher.
- Cheung, C.M.K., Chiu, P.-Y. & Lee, M.K.O., 2011. Online social networks: Why do students use facebook? *Computers in Human Behavior*, 27(4), pp.1337–1343.
- Csikszentmihályi, M., 1990. *Flow: The Psychology of Optimal Experience* 1st ed., New York: Harper & Row.
- Deci, E.L., 1971. Effects of externally mediated rewards on intrinsic motivation. *Journal of Personality and Social Psychology*, 18, pp.105–115.
- Deci, E.L., 1975. *Intrinsic Motivation*, New York, NY, USA: Plenum Press.
- Deci, E.L. & Ryan, R.M., 1985. *Intrinsic motivation and self-determination in human behavior* P. Press, ed., Plenum Press.
- Deci, E.L. & Ryan, R.M., 2008. Self-determination theory: A macrotheory of human motivation, development, and health. *Canadian Psychology/Psychologie canadienne*, 49, pp.182–185.

- Deci, E.L. & Ryan, R.M., 2000. The “What” and “Why” of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychological Inquiry*, 11, pp.227–268.
- Deloitte, 2011. Tech Trends 2012 Elevate IT for digital business, Deloitte. Available at: http://www.deloitte.com/assets/Dcom-UnitedStates/LocalAssets/Documents/us_cons_techtrends2012_013112.pdf. [30 August 2014].
- Deterding, S. et al., 2011. From Game Design Elements to Gamefulness: Defining “Gamification.” In *Proceedings of the 15th International Academic MindTrek Conference*. Tampere, Finland: ACM Press, pp. 9–15.
- Festinger, L., 1954. A Theory of Social Comparison Processes. *Human Relations*, 7, pp.117–140.
- Fogg, B., 2009. A behavior model for persuasive design. In *Proceedings of the 4th International Conference on Persuasive Technology*. Persuasive '09. Claremont, CA, USA: ACM Press, p. 1-7.
- Gartner, 2011. Gartner Predicts Over 70 Percent of Global 2000 Organisations Will Have at Least One Gamified Application by 2014. Available at: <http://www.gartner.com/newsroom/id/1844115>. [30 August 2014].
- Gartner, 2012. Gartner Says by 2014, 80 Percent of Current Gamified Applications Will Fail to Meet Business Objectives Primarily Due to Poor Design. Available at: <http://www.gartner.com/newsroom/id/2251015>. [30 August 2014].
- Gigerenzer, G. & Todd, P.M., 1999. Fast and frugal heuristics: The adaptive toolbox. In *Simple heuristics that make us smart*. pp. 3–34.
- Gutman, J., 1982. A Means-End Chain Model Based on Consumer Categorization Processes. *Journal of Marketing*, 46(2), pp.60–72.
- Hamari, J. & Koivisto, J., 2013. Social Motivations To Use Gamification: An Empirical Study Of Gamifying Exercise. In *ECIS 2013 Completed Research*. Utrecht, Netherlands, pp. 1–12.
- Hamari, J., Koivisto, J. & Sarsa, H., 2014. Does Gamification Work? - A Literature Review of Empirical Studies on Gamification. In *47th Hawaii International Conference on System Sciences*. Hawaii, USA: IEEE Computer Society, pp. 3025–3034.
- Herzberg, F., Mausner Bernard, 1920- & Snyderman, B.B., 1959. *The motivation to work* 2nd ed., New York : Wiley ; London : Chapman & Hall.
- Huotari, K. & Hamari, J., 2012. Defining Gamification - A Service Marketing Perspective. In *Proceedings of The 16th International Academic MindTrek Conference*. Tampere, Finland: ACM Press, pp. 17–22.
- Kamal, N. et al., 2013. Helping Me Helping You: Designing to Influence Health Behaviour through Social Connections. In *Human-Computer Interaction – INTERACT 2013*. Cape Town, South Africa, pp. 708–725.
- Kankanhalli, A. et al., 2012. Gamification: A New Paradigm for Online User Engagement. In *ICIS 2012 Proceedings*. Orlando, FL, USA, pp. 1–10.
- Katz, E., Blumler, J.G. & Gurevitch, M., 1973. Uses and Gratifications Research. *Public Opinion Quarterly*, 37, pp.509–523.
- Kelman, H.C., 1958. Compliance, identification, and internalization: Three processes of attitude change. *Journal of Conflict Resolution*, 2(1), pp.51–60.
- Korn, O., 2012. Industrial playgrounds: how gamification helps to enrich work for elderly or impaired persons in production. In *Proceedings of the 4th ACM SIGCHI symposium on Engineering interactive computing systems - EICS '12*. Copenhagen: ACM Press, pp. 313–316.
- Levy, Y. & Ellis, T.J., 2006. A Systems Approach to Conduct an Effective Literature Review in Support of Information Systems Research. *Informing Science*, 9, pp.181–212.
- Lin, H.-F., 2008. Determinants of successful virtual communities: Contributions from system characteristics and social factors. *Information & Management*, 45(8), pp.522–527.
- Locke, E.A. & Latham, G.P., 1990. *A theory of goal setting and task performance*, Prentice-Hall.
- Locke, E.A. & Latham, G.P., 2002. Building a practically useful theory of goal setting and task motivation. A 35-year odyssey. *The American psychologist*, 57, pp.705–717.
- Malone, T.W., 1981. Toward a Theory of Intrinsically Motivating Instruction. *Cognitive Science: A Multidisciplinary Journal*, 5, pp.333–369.
- Maslow, A.H., 1943. A theory of human motivation. *Psychological Review*, 50, pp.370–396.

- Massung, E. et al., 2013. Using crowdsourcing to support pro-environmental community activism. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems - CHI '13. Paris, France: ACM Press, pp. 371–380.
- McClelland, D.C., 1962. Business drive and national achievements. *Harvard Business Review*, 40(4), pp.99–112.
- Meloni, W. & Gruener, W., 2012. Gamification in 2012: Consumer and Enterprise Market Trends, M2 Research.
- Nahapiet, J. & Ghoshal, S., 1998. SOCIAL CAPITAL, INTELLECTUAL CAPITAL, AND THE ORGANIZATIONAL ADVANTAGE. *Academy of Management Review*, 23, pp.242–266.
- O'Leary, D.E., 2008. Gartner's hype cycle and information system research issues. *International Journal of Accounting Information Systems*, 9(4), pp.240–252.
- Papacharissi, Z. & Rubin, A.M., 2000. Predictors of Internet Use. *Journal of Broadcasting & Electronic Media*, 44, pp.175–196.
- Pelling, N., 2011. The (short) prehistory of “gamification” ... Available at: <http://nanodome.wordpress.com/2011/08/09/the-short-prehistory-of-gamification/>. [30 August 2014].
- Preece, J., 2001. Sociability and usability in online communities: determining and measuring success. *Behavior and Information Technology*, 20, pp.347–356.
- Richardson, C.R. et al., 2010. An online community improves adherence in an internet-mediated walking program. Part 1: results of a randomized controlled trial. *Journal of medical Internet research*, 12, p.e71.
- Ruggiero, T.E., 2000. Uses and Gratifications Theory in the 21st Century. *Mass Communication and Society*, 3, pp.3–37.
- Ryan, R.M., Rigby, C.S. & Przybylski, A., 2006. The motivational pull of video games: A self-determination theory approach. *Motivation and Emotion*, 30, pp.347–363.
- Shang, S.S.C. & Lin, K.Y., 2013. An Understanding of the Impact of Gamification on Purchase Intentions. In *AMCIS 2013 Proceedings*. Chicago, IL, USA, pp. 1–11.
- Sjöklint, M., Constantiou, I. & Trier, M., 2013. Numerical Representations and User Behaviour in Social Networking Sites: Towards a Multi-Theoretical Research Framework. In *ECIS 2013 Completed Research*. Utrecht, Netherlands, pp. 1–12.
- Skinner, B.F., 1953. *Science and Human Behavior*, New York: Macmillan.
- Teh, N. et al., 2013. Can Work Be Fun? Improving Task Motivation and Help-Seeking Through Game Mechanics. In *ICIS 2013 Proceedings*. Milan, Italy, pp. 1–8.
- Thaler, R.H. & Shefrin, H.M., 1981. An Economic Theory of Self-Control. *Journal of Political Economy*, 89, p.392.
- Thom, J., Millen, D. & DiMicco, J., 2012. Removing gamification from an enterprise SNS. In Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work - CSCW '12. Seattle, WA, USA: ACM Press, pp. 1067–1070.
- Vassileva, J., 2012. Motivating participation in social computing applications: a user modeling perspective. *User Modeling and User-Adapted Interaction*, 22(1-2), pp.177–201.
- Vroom, V.H., 1964. *Work and motivation*, John Wiley & Sons, Inc.
- Webster, J. & Watson, R.T., 2002. ANALYZING THE PAST TO PREPARE FOR THE FUTURE: WRITING A LITERATURE REVIEW. *Management Information Systems Quarterly*, 26(2), pp.xiii–xxiii.
- Yee, N., 2006. Motivations for play in online games. *Cyberpsychology & behavior : the impact of the Internet, multimedia and virtual reality on behavior and society*, 9, pp.772–775.