A DESCRIPTIVE LITERATURE REVIEW AND CLASSIFICATION FRAMEWORK FOR GAMIFICATION IN INFORMATION SYSTEMS

Complete Research

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Abstract

Gamification evolved to one of the most important trends in technology and therefore gains more and more practical and scientific notice. Yet academia lacks a comprehensive overview of research, even though a review of prior, relevant literature is essential for advancing knowledge in a field. Therefore a novel classification framework for Gamification in Information Systems with the intention to provide a structured, summarized as well as organized overview was constructed to close this gap of research. A literature review on Gamification in quality outlets combined with a Grounded Theory approach served as a starting point. As a result this paper provides a foundation for current and future research to advance the knowledge on Gamification. Moreover it offers a structure for Gamification research which was not available previously. Findings from the literature review were mapped to the classification framework and analyzed. Derived from the classification framework and its outcome future research outlets were identified.

Keywords: Classification Framework, Gamification, Grounded Theory, IS Research, Literature Review.

1 Introduction

The term Gamification evolved to one of the most important trends in technology (Deloitte, 2011). Since 2011 Gartner values the importance of Gamification by incorporating the term into their Hype Cycle[1] as an emerging technology for the next five to ten years. 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 and 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 in high ranked outlets. Despite the significant attention to the best of knowledge there is a lack of a comprehensive overview of research regarding Gamification in the field of IS. Hamari et al. (2014) and Seaborn and Fels

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[1] http://www.gartner.com/newsroom/id/2819918

(2014) already conducted a literature review on Gamification, yet both papers did not apply a general view but focused their research on empirical studies or theoretical reviews. Furthermore no classification was applied. However a review of prior, relevant literature is essential and creates a solid basis for advancing knowledge in a field (Webster and Watson, 2002). Therefore the purpose of this paper is to close this gap and to provide a structured, summarized as well as organized overview of research activities and academic knowledge of high quality. The intention is to show what current IS research in high ranked outlets discusses regarding Gamification as a basis for future research activities and as a knowledgebase. This was accomplished by analyzing 43 top ranking IS journals as well as IS conferences and corresponding streams. The findings were illustrated in the form of a comprehensive classification framework. Furthermore the identified literature was mapped to the classification framework and afterwards analyzed in more detail.

2 Gamification

Coined in the digital media industry Gamification gained widespread adoption after the second half of 2010[2]. The origin of the phrase cannot be dated back unambiguously. Opinions diverge between its first occurrence in 2008, respectively 2002 where Pelling (2011) claims to have used the term for the first time. The first Gamification system was introduced by Bunchball[3], 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. Trying to give Gamification a unique characterization is difficult as various understandings exist (Deterding et al. 2011). 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. The term Gamification itself, its meaningfulness and the question if it is more than just a temporary marketing fad which solely adds a layer of points and levels without further purpose is discussed controversial e.g. in (Bogost, 2011; Robertson, 2010). This also leads aforementioned authors to propose different terms, for instance "pointification" (Robertson, 2010) or "exploitationware" (Bogost, 2011). Nonetheless the term Gamification is the most renowned.

Several attempts to define Gamification exist, both in industry and academia. Focusing exclusively on academic definitions, two[4] are to be considered:

- *The use of game design elements in non-game contexts* (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 as this is the most often cited definition (see footnote 4).

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[2] http://www.google.com/trends/explore#q=Gamification

[3] http://www.bunchball.com

[4] Searching for "gamification definition" on Google Scholar (http://scholar.google.com/scholar?q=gamification+definition) reveals the two definitions as the most popular ones. (Deterding et al. 2011) with 771 and (Huotari and Hamari 2012) with 170 citations (as of 23 March 2015).

3 Research Methodology

This section outlines how the literature review as the basis for the classification framework was approached in detail. The proceeding was inspired by two works from Yang and Tate who conducted a descriptive literature review and classification of cloud computing research (Yang and Tate, 2009, 2012).

3.1 Review Method

Literature reviews can be conducted as narrative review, descriptive review, vote counting and as a meta-analysis. One differentiation is the application of a qualitative versus a quantitative perspective (King and Jun, 2005). The paper at hand follows a descriptive method, which is settled between narrative review (qualitative focus) and vote counting (quantitative focus). Characteristics of descriptive reviews are to reveal interpretable patterns from existing literature and to introduce quantifications (Guzzo et al., 1987). Furthermore in order to generalize results a descriptive review incorporates coding of all relevant papers within a target area on certain characteristics (King and Jun, 2005). Therefore carrying out a descriptive literature review was seen as most appropriate to support the creation of a classification framework. Due to the novelty of the research topic, mostly quantitative approaches were not already applicable at that stage, e.g. because of lack of research.

3.2 IS Literature Retrieval

The literature review was initialized by first focusing on contributions in the leading international IS journals as proposed by Webster and 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 excluded[5]. 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 and Ellis (2006). To broaden the insight within the scope of IS and considering its interdisciplinary nature (Webster and Watson, 2002), corresponding streams of IS research were also consulted if applicable. Banker and Kauffman (2004) identified and described five different streams of IS research 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" and thus is related to disciplines like cognitive psychology, decision science and design science (Banker and Kauffman, 2004). As one of the key aspect of Gamification is 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 Human Computer Interaction thus represents an additional important area to examine. Consequently high quality journals as well as conferences within the area of Human Computer Interaction were selected based on the same rigorousness as for IS. Journals were chosen, based on the impact factor provided by the Institute for Scientific Infor-

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[5] 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.

mation (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 ranked[6] 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 or partnered by the SIGCHI were added to the selection.

The following list gives an overview of the included journals and conferences[7].

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; Int. British Computer Society Human Computer Interaction Conf.; The ACM SIGCHI Symposium on Engineering Interactive Computer Systems; First Int. Conf. on Gameful Design, Research, and Applications; 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, especially from lower ranked outlets, 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. Title, abstract and keyword section as well as the full body were scanned. Within this phase 104 articles were identified.

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[6] This means A* and A ranked conferences.

[7] Explanation: IS = Information Systems, Int. = International, Conf. = Conference.

3.3 Filtering Process

All identified articles had to meet several criteria 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): Every article has to have a length of at least four pages.

- Criterion (3): The term gamif* is found at least once in the title and/or the abstract and/or the keyword section and/or otherwise at least above average[8] in the full body section of the article to ensure a first approach to a certain kind of relevance on the topic of Gamification.

- Criterion (4): The study focuses on Gamification instead of full fledged games.

Consequently abovementioned criteria were used to examine[9]: (1, 2) only (full-length) papers, (3) which focus on Gamification, while excluding similar but not equal concepts (4). The outlined criteria lead to a first set of 33 valid papers. To not miss a relevant paper through this rigorous process, all excluded papers that met the outlined criteria except criterion 3 were read, which increased the total count of papers to 71. This step required to make more decisions for inclusion and exclusion which dynamically evolved by first reading all papers of this set. The definition of Deterding et al. (2011) was used as a reference to decide if Gamification in their sense occurred or not[10]. This was on the one hand particularly relevant for the context on which elements of Gamification were applied to. Solely a non-game context was considered relevant. On the other hand the usage of contestant terms like serious games or persuasive games made it hard to clearly draw the line. Again the understanding of Deterding et al. (2011) was used to make a decision. In total four more papers were added within this phase to the initial 33 valid papers. The now identified set of papers was reviewed once again. In this phase articles that did not focus on Gamification in any aspect but barely mentioned the term as a new phenomenon or concept were excluded. This lead to 34 articles that centrally deal with or at least incorporate Gamification as an important building block within their work and are settled in the domain of IS.

3.4 Classification Process

The classification to structure, summarize and organize literature was accomplished by using a Grounded Theory approach as introduced by Glaser and Strauss (1967). Wolfswinkel et al. (2011) proposed Grounded Theory as a method for rigorously reviewing literature and provided a guide on how to successfully conduct this task. Using Grounded Theory in IS research has become an emerging methodology as amongst others accredited by Urquhart et al. (2009). Therefore this methodology was found applicable. In the following, the three stages used to classify the articles are explained.

In the first stage open coding was applied to capture codes that deal with Gamification in an article. Therefore codes were generated from title and abstract sections. If the generated codes could not represent the main application of Gamification for the specific paper, the full body of the article was coded as well. Categories that represent a "higher-order conceptualization" (Wolfswinkel et al., 2011) were formulated by aggregating groups of concepts with similar properties. In sum this process generated 45 different codes.

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[8] Sum of all occurrences of gamif* in all papers, divided by the number of papers.

[9] Explanation is given in the same order as the four criteria were introduced.

[10] Deterding et al. (2011) was used as reference as Deterding et al. (2011) have a significant higher citation count on google scholar than Huotari and Hamari (2012).

In the second stage axial coding was applied which involved inductive as well as deductive procedures in order to correlate the located concepts and categories found in the first stage further into categories and subcategories. Concepts can be categories or emerge into (sub-)categories (Glaser and Strauss, 1967; Wolfswinkel et al., 2011). The set of resulting (sub-)categories was then compared with the updated keyword classification scheme for IS research literature by Barki et al. (1993). The purpose was to properly structure and label the identified (sub-)categories. Consequently this literature review can easily be incorporated into the existing body of knowledge of IS research as familiar terms were used.

The final stage involved selective coding. At this level the identified main categories were refined and integrated. Again the classification scheme of IS keywords was used to support this process. All three steps were conducted in a non-linear fashion, which means comparing, relating and linking the identified findings continuously. Thus a so called comparative analysis was executed (Glaser and Strauss, 1967; Wolfswinkel et al., 2011).

4   Results

Based on the aforementioned preconditions a classification framework evolved as shown in Table 2. The framework contains four top categories and 19 subcategories, both arranged in alphabetical order.

Category	Subcategory
Application Area	Computer Aided Design, Collaborative Work System, Education, Health, Manufacturing & Production, Marketing
Conceptualizing Gamification	Definition, Design, Development Methods and Tools, Types
Management Issues	Evaluation, Integration, Planning Objectives, User Behavior, User Requirement, User Types
Theoretical Issues	Behavior, Motivation, Research

Table 2.   Classification Framework for Gamification: Categories and Subcategories.

4.1   The Classification Framework

In the following the categories and subcategories are described. Contextual overlaps among subcategories of the same or different category were avoided as far as possible. Subcategories themselves aggregate information (see Classification Process). Particular information might be relevant but not explicitly accessible (visible) due to the high aggregation level of the classification framework. Therefore, where found reasonable and inevitable for a better understanding of the subject matter sub subcategories were introduced. Sub subcategories are not illustrated in the actual classification framework to reduce complexity. They are visualized in italic formatting in the following paragraph[11]. Barki et al. (1993) used alphanumeric codes within their classification scheme. A single character A – I stands for a top level (highest aggregation) classification. Two characters AA – ID for the second level and AA01 – ID05 for the third level (lowest aggregation) of classification. Wherever possible the second and third level codes were used from the same top level classification. Next to the components of the classification framework for Gamification these codes are provided. The goal is to better illustrate the mapping process, show the correlation between (sub) subcategories as well as to make it more reproducible. If a mapping was not applied the code O (own) was used.

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[11] Furthermore all sub subcategories are listed and used in Figure 1.

Application Area (HB): The various areas Gamification is employed in. Some subcategories aggregate multiple areas: Collaborative Work Systems (HA12) summarizes crowdsourcing-, enterprise- and social networking systems. Education (HB08) incorporates tutorial as well as learning systems. Marketing (HB19) incorporates purchasing systems. Computer Aided Design is derived from (HB06), Manufacturing & Production from (HB18 and HB24), and Health from (HB20).

Conceptualizing Gamification (O): Conceptualizing gives a general view on Gamification. Definitions, the overall design of Gamification, including components like game mechanics and game elements as well as proposals and guidelines for Gamification are provided. Moreover applied development methods for Gamification are summarized under this topic. Last types of possible application instantiations are named.

- Definition (O): Description of the nature, scope or meaning of Gamification.

- Design (FB04): Covers *game elements (O)* and *game mechanics (O)* in Gamification; *design guidelines* (FB04) for a correct application of components for Gamification; and design recommendations for Gamification in the form of *design proposals* (FB04).

- Development Methods and Tools (FC): Methods and tools for the development of Gamification applications.

- Types (HA): General type of platform or environment Gamification was integrated into.

Management Issues (E): Practical implications of Gamification are covered. Implementation attempts and their outcomes are discussed and evaluated on a multitude of aspects. Furthermore the objectives to use Gamification are outlined. Another topic are users and their interaction with Gamification, including user behavior influenced by Gamification, the user requirements useful for successful Gamification as well as the identification of user types.

- Evaluation (EI): Covers *effectiveness* (EI0201) in the form of a positive or a negative outcome of Gamification; *user satisfaction* (EI0207) in the form of engagement, entertainment, and enjoyment when interacting with Gamification; *ex ante ex post* (EI01) analysis of the state before and after Gamification was employed; analysis of an increase or decrease in *data quality* (EI0206) when using Gamification; and not further specified, *general evaluation* (EI).

- Integration (EL06): Concrete type of platform or environment Gamification was integrated into.

- Planning Objectives (EF03): The intended goals for using Gamification.

- User Behavior (GB03): The activity of the user in the form of a positive or negative participation and contribution.

- User Requirements (GB05): Covers the characteristics necessary/useful for users to use/adopt Gamification, including *individual incentives and rewards* (O) as well as *individual Gamification elements* (O).

- User Types (GB04): The specified target audience.

Theoretical Issues (O): General theoretical principles mentioned in conjunction with Gamification as well as applied research methods, the employed references and future research recommendations are covered in theoretical issues.

- Behavior (AA01): General behavioral theories which are set in the context of Gamification. The intention is to help understand as well as to improve or to inspire Gamification.

- Motivation (AA07): General motivational theories which are set in the context of Gamification. The intention is to help understand as well as to improve or to inspire Gamification.

- Research (AI): Covers *references* (sample size) (AI), *research methodologies* (AI01), and *future research* (AI) outlets.

4.2   Distribution by Classification Framework

Based on this classification framework for Gamification all relevant information within each paper were mapped to one of the (sub) subcategories. Sections with an introductory purpose containing information not used in the remaining paper, and therefore considered not part of the actual research, were sorted out. Information might be ambiguous and consequently assignable to multiple (sub) subcategories. For simplicity and ease of use each piece of information was assigned to the most applicable or most concrete (sub) subcategory. This led to a matrix in the style as proposed by Webster and Watson (2002) and refined by Wolfswinkel et al. (2011), shown in Figure 1.

Author	App: Education	App: Collaborative Work System	App: Manufacturing & Production	App: CAD	App: Health	App: Marketing	Design: Game Elements	Design: Game Mechanics	Design: Design Guidelines	Design: Design Proposals	Definition	Types	Development Methods and Tools	Eval: Effectiveness	Eval: User Satisfaction	Eval: Ex Ante ex Post	Eval: General Evaluation	Eval: Data Quality	Planning Objectives	User Behavior	User Types	User Req: Individual Incentives and Rewards	User Req: Individual Gamification Elements	Integration	Research: References	Research: Research Methodologies	Research: Further Research	Behavior	Motivation	Total
[1] (Anderson et al. 2013)	◆						◆					◆							◆						◆					5
[2] (Barata et al. 2013)	◆						◆				◆	◆		◆		◆	◆		◆	◆	◆				◆	◆		◆	◆	14
[3] (Browne et al. 2013)	◆						◆			◆	◆	◆		◆	◆						◆				◆	◆				10
[4] (Cechanowicz et al. 2013)						◆	◆				◆	◆		◆		◆	◆	◆							◆	◆				10
[5] (Cheong et al. 2013a)	◆			◆			◆	◆			◆	◆		◆	◆				◆		◆		◆		◆	◆		◆		14
[6] (Cheong et al. 2013b)	◆						◆	◆		◆	◆	◆		◆	◆				◆		◆				◆	◆				12
[7] (Comber et al. 2013)		◆									◆	◆		◆	◆					◆	◆				◆					8
[8] (Costa et al. 2013)	◆						◆					◆		◆					◆	◆					◆	◆				8
[9] (Denny 2013)	◆						◆					◆		◆	◆			◆		◆	◆				◆	◆		◆		11
[10] (Eveleigh et al. 2013)							◆				◆	◆		◆	◆			◆								◆				7
[11] (Fitz-Walter et al. 2013)	◆										◆	◆		◆	◆	◆			◆						◆	◆				9
[12] (Flatla et al. 2011)							◆	◆	◆		◆	◆	◆		◆	◆	◆		◆						◆	◆				12
[13] (Hamari and Koivisto 2013)			◆						◆		◆	◆				◆									◆	◆		◆	◆	9
[14] (Kankanhalli et al. 2012)							◆	◆	◆		◆								◆									◆	◆	7
[15] (Kappen and Johannsmeier 2013)							◆	◆				◆			◆				◆	◆					◆	◆		◆	◆	10
[16] (Kappen and Nacke 2013)							◆					◆	◆															◆		4
[17] (Kim et al. 2013)	◆						◆					◆		◆					◆	◆					◆					7
[18] (Knaving and Björk 2013)									◆		◆																	◆	◆	4
[19] (Korn 2012)			◆								◆	◆	◆						◆	◆	◆								◆	8
[20] (Li, Grossman et al. 2012)							◆	◆			◆	◆	◆	◆	◆	◆			◆						◆	◆				11
[21] (Li, Huang et al. 2012)							◆					◆		◆					◆						◆	◆				6
[22] (Massung et al. 2013)		◆					◆		◆		◆	◆		◆	◆										◆	◆			◆	10
[23] (Mekler et al. 2013)							◆				◆	◆		◆	◆		◆		◆						◆	◆			◆	10
[24] (Neil et al. 2013)		◆					◆	◆			◆	◆							◆	◆	◆									8
[25] (Paoli et al. 2012)							◆		◆			◆							◆											4
[26] (Rojas et al. 2013)									◆	◆			◆																	3
[27] (Seaborn et al. 2013)							◆			◆				◆																3
[28] (Sepehr and Head 2013)	◆										◆	◆	◆	◆							◆				◆	◆			◆	9
[29] (Shang and Lin 2013)					◆						◆		◆						◆				◆		◆	◆		◆		8
[30] (Sjöklint et al. 2013)		◆					◆				◆								◆	◆								◆		6
[31] (Takagi et al. 2013)							◆					◆		◆	◆		◆				◆									6
[32] (Thom et al. 2012)		◆					◆			◆				◆		◆	◆		◆					◆						8
[33] (Vassileva 2012)							◆	◆				◆							◆			◆	◆					◆	◆	8
[34] (Yee et al. 2012)												◆	◆												◆					3
Total	10	4	2	1	1	2	25	8	5	8	24	23	7	19	13	6	6	4	17	11	11	1	2	2	21	18	4	8	9	

Figure 1.   *Framework Matrix (Alphabetical order of top categories, sorted by count of findings within a subcategory/sub subcategory. Discussed categories are marked.).*

The matrix shows the aforementioned ternary subdivision with sub subcategories, for a finer granularity of the classification. The categories are sorted alphabetically. Within each category the (sub) subcategories are sorted by the count of findings. The total numbers of findings for each (sub) subcategory are provided on the axis of abscissae. The total numbers of findings within each paper are provided on the axis of ordinates. Each paper was numbered from 1 to 34. These numbers are applied to this section for a better and easier reference. For each category the topics which are above arithmetic mean per category were deduced from the framework. Additionally a more detailed analysis of these key topics is provided in the following:

Application Area: Education (10 papers / 29%) and Collaborative Work Systems (4 papers / 12%).

- Education: Education might be the leading application area due to its relatively effortless feasibility in an academic setting where education is omnipresent.

- Collaborative Work Systems: Crowdsourcing was named by [22] Social networking sites were named by [7,30] and enterprises by [32].

Conceptualizing Gamification: Game Elements (25 papers / 74%), Definition (24 papers / 71%), and Types (23 papers / 68%).

- Game Elements: Points [2,4,5,6,10,14,15,17,22,23,30,31,32,33] badges [1,9,12,14,16,20, 22,25,32,33], and leaderboards [5,6,8,12,14,16,17,22,23,27,30,31] were the most frequently named game elements. It could be observed that various named game elements e.g. levels and ranks; grades, points, and scores seem to be very similar in their meaning.

- Definition: (Deterding et al., 2011) provided the prevalent definition for Gamification with being cited by 21 papers [3,4,5,6,7,10,11,12,14,16,18,19,20,21,22,23,24,25,28,30,33].(Huotari and Hamari, 2012) were only named once in [13]. Other definition attempts came from Gamification.com cited by [33], (Wu, 2011) cited by [14], (Werbach and Hunter, 2012) cited by [6], and (Zichermann and Cunningham, 2011) cited by [29]. It is worth mentioning that all papers which employed more than one definition [6,14,33] also cited (Deterding et al., 2011).

- Types: Papers took full fledged games as data source[12] (World of Warcraft) [34] and as source of inspiration (Tetris) [19] for their studies. A new application from scratch was developed in 13 papers [1,3,5,6,8,11,12,15,17,19,22,23,24]. Five papers analyzed an already gamified application [7,13,21,28,31]. Four papers extended an existing platform with Gamification [2,9,10,20]. [4] created three versions of a marketing research survey. A non gamified, semi gamified, and fully gamified version.

Management Issues: Planning Objectives (17 papers / 50%), Effectiveness (19 papers / 56%), User Satisfaction (13 papers / 38%), User Behavior (11 papers / 32%), and User Types (11 papers / 32%).

- Planning Objectives: Healthier behavior at work was analyzed in [19,24]. In [5,6,20] an effective and engaging learning system for new users was created, similar to [2] who tried to improve student engagement to impact the learning experience. In [12] it was tried to make boring but necessary tasks more fun. An approach to influence user behavior was conducted in [29] for a marketing context, in [21] to increase participation, in [17] to increase altruism, and in [23] to test if game elements harm intrinsic motivation. Next Gamification was used to represent the perception of others towards an individual [30] and the reputation of an individual [25] through game elements. [14] aimed to drive desired user behavior based on game mechanisms and design. Motivating individuals with Gamification elements was discussed in [1]. [8]

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[12] User information from Word of Warcraft was used as sample for a study.

wanted to improve punctuality of working teams through leaderboards.[15] analyzed two gamified task management applications.

- Effectiveness: Badges were seen positive [21] however only for a short period of time, which was upon revision confirmed in [32]. Further badges provided a highly significant positive effect on the quantity of students' contribution [9]. [22] provided the empirical evidence for effectiveness of leaderboards hence without reaching a significant level. In [5,6,17] the usability of leaderboards was also acknowledged. The effectiveness of progress bars was confirmed in [5,6]. [31] found out that levels were highly motivating.

- User Satisfaction: User satisfaction was stated in [3,5,6,9,11,12,20,22,31]. Also decreased satisfaction and demotivation e.g. if performance on a leaderboard was low [5,10,22] or only little overall sustained engagement [7,23] was identified. No change in user satisfaction was communicated by [15].

- User Behavior: User activity was discussed in [30,32,33]. Approaches to change the behavior of individuals were outlined in [7,24]. [19] wanted to increase motivation and performance. Increasing user participation and engagement was discussed in [2,9,11], motivating contribution in [17]. Being more engaged and productive was discussed in [15].

- User Types: Papers focused their research on elderly and impaired [19,31], students [2,3,5,6,7,8,9,28] and office workers [24].

Theoretical Issues: References (21 papers / 62%) and Research Methodologies (18 papers / 53%).
- References: 14 (66%) papers with a sample size used less than 100 samples. Most of the time individuals were used as references. Furthermore a set of gamified applications [29] or a dataset history was used as sample size [21,34].

- Research Methodologies: Considering questionnaires and surveys synonymously then 14 (78%) of all papers providing a research methodology incorporated this research methodology in their study [2,3,4,5,6,8,10,11,12,13,15,20,22,28]. Further methodologies were e.g. case analysis [29].

5 Discussion

The primary objective of the paper was to present a literature review of Gamification in high quality IS research in order to establish a classification framework that provides an overview of the state of art in Gamification research. The classification framework for Gamification was deduced from existing high ranked IS literature on Gamification with the help of a Grounded Theory approach. Due to the terminological mapping with the updated keyword classification scheme for IS research literature, the framework can easily be applied and compared to other research areas of IS. The framework classifies Gamification in Application Areas, Conceptualizing Gamification, Management Issues and Theoretical Issues as well as corresponding subcategories. Providing a structured, summarized as well as organized overview of research activities and academic knowledge closes an important research gap in IS and is of high relevance to foster the progress of knowledge in Gamification.

A quantification of findings from the literature review on Gamification in conjunction with the classification framework revealed[13] that effectiveness and planning objectives (Management Issues) as well as game elements, definition and types (Conceptualizing Gamification) were discussed most

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[13] By analyzing the most frequent subcategories which are above arithmetic mean and neglecting the subcategory research which does not seem appropriate for a comparison.

frequently. This allows an interpretation of the current evolutionary state Gamification is in. Namely a new and nascent state which tries to give answers to elementary questions i.e. if Gamification is effective/successful (Effectiveness), what can be done with Gamification (Planning Objectives/Types) and what Gamification depicts (Definition) as well as its building blocks (Game Elements). This state, identified through the analysis of the provided classification framework, is coherent to Gartner's current positioning of Gamification within their 2013 Hype Cycle, namely the "Peak of Inflated Expectations" and therefore in reverse strengthens the validity of the presented framework. 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). Again this is also affirmed by the identified papers.

Recently Hamari et al. (2014) also provided a literature review on Gamification to answer the question if "Gamification works". They did not apply a general view but only focused on empirical studies. Nevertheless, based on a comparable amount of analyzed papers (24) they reported similar findings e.g. the same most common game elements (badges, points, and leaderboards), the most frequently used application domain (education) as well as a surprising low share of literature settled in the marketing domain though Gamification is said to originate from that domain (Deterding et al., 2011). Seaborn and Fels (2014) did a systematic survey on the use of Gamification in 31 theoretical reviews and research papers. Again the authors outlined education as the most frequent application domain. Furthermore badges, points, leaderboards and rewards were the most common identified game elements. Consequently all three literature reviews on Gamification, also including this research, show a plethora of similar findings. Yet the novelty of the paper at hand is the creation of a comprehensive classification framework as well as the mapping of findings to this framework which is believed to provide a structured and easy to compare overview of current research and knowledge.

The classification framework offers several possibilities for further investigations. In a next step future research could provide a detailed analysis of all subcategories of the framework, mapped with the identified literature. This might provide further, valuable insights on current research. Moreover research could test the applicability and usability of the provided framework by applying it to a different set of data. One possibility would be to conduct a transfer to the industry driven, practical view on Gamification. This could for example be achieved by analyzing case studies, blog posts or reports from e.g. consulting companies. Besides obtaining a deeper view on Gamification, this might also offer the possibility to refine and extend the existing framework. For instance there is a high probability that Gamification is applied to various more application areas than identified in the classification framework. Barki et al. (1993) also named Banking amongst others as a further application area within IS research. Though not intended in the paper at hand, another possible new set of data for the provided framework could be low tiered journals and conferences which have quicker review time and might be more reflective of current trends. This dataset could be used to reveal new upcoming trends within the domain of Gamification which have not yet been but should also be covered by high quality journals and conferences. Consequently comparing the different data sets might deliver implications for current and future research directions. Furthermore it would be interesting to see the evolution of (sub-) categories over time in the form of their occurrence in literature. Therefore a quantitative approach seems valuable. As a result this might aid to make future predictions or help to find new research areas for Gamification in IS. Furthermore future empiric or experimental research could introduce quantifiers for the subcategories as not every subcategory seems to be equally important.

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. 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 phenome-

non. Nevertheless based on the goal to provide a high quality academic view on Gamification from an IS perspective and considering the fact that the term Gamification is the most renowned phrase it is believed that these limitations are acceptable.

6 Conclusion

Several contributions were made to the scientific community. First relevant IS literature was collected, analyzed and filtered from 43 top ranking IS journals as well as IS conferences. Second structuring and classification based on a Grounded Theory approach was conducted on the filtered set of literature. Third a novel classification framework was derived. In an abstract and simplified, yet comprehensive way, the framework organizes and systemizes existing academic knowledge about the phenomenon of Gamification in high quality IS research. Fourth identified literature was mapped to the classification framework. The main findings were analyzed as well as discussed. The framework contributes a valuable basis to conduct future research endeavors as it offers a reference of current research as well as trends and therefore in reverse also implies what has not yet been discussed in high quality academic outlets and accordingly uncovers avenues for future research. Moreover it applies a structure to Gamification research which has not been offered yet and helps to synthesize the current academic knowledgebase of Gamification. The employed keywords for the classification framework followed by a detailed definition for each keyword provide the basis for a clear and common language for Gamification. To that effect it is believed that the research at hand provides a valuable and significant contribution for IS, with relevance for research and practice.

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