Does Gamification Work? — A Literature Review of Empirical Studies on Gamification

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Abstract

This paper reviews peer-reviewed empirical studies on gamification. We create a framework for examining the effects of gamification by drawing from the definitions of gamification and the discussion on motivational affordances. The literature review covers results, independent variables (examined motivational affordances), dependent variables (examined psychological/behavioral outcomes from gamification), the contexts of gamification, and types of studies performed on the gamified systems. The paper examines the state of current research on the topic and points out gaps in existing literature. The review indicates that gamification provides positive effects, however, the effects are greatly dependent on the context in which the gamification is being implemented, as well as on the users using it. The findings of the review provide insight for further studies as well as for the design of gamified systems.

1. Introduction

During the last couple of years, gamification [9][28][31] has been a trending topic and a subject to much hype as a means of supporting user engagement and enhancing positive patterns in service use, such as increasing user activity, social interaction, or quality and productivity of actions [25]. These desired use patterns are considered to emerge as a result of positive, intrinsically motivating [35], "gameful" experiences [31] brought about by game/motivational affordances implemented into a service.

As a result, gamification is touted as a next generation method for marketing and customer engagement in popular discussion (e.g. [45]). For instance, Gartner [19] estimates that over 50% of organizations managing innovation processes will gamify aspects of their business by 2015. Furthermore, there is an increasing number of successful startups whose entire service is focused on adding a gamified layer to a core activity (e.g. Codecademy, a service that uses game-like elements to help teach users how to code), or who assist more traditional companies in gamifying their existing services (e.g. Badgeville).

The popular interest in gamification is also reflected in an academic context: the number of papers published on gamification is growing. Figure 1 gives an overview of the increase of writings on the topic. It is especially noteworthy that the appearance of the term "gamification" in paper titles has been increasing even more rapidly than general search hits. This suggests that gamification is becoming a more popular subject for academic inquiry.

Despite the large amount of hits on the topic, there is a dearth of coherent understanding on what kind of studies have been conducted under the term gamification, with which methods, what kinds of results they yield, and under which circumstances.

Understanding whether gamification is effective is also a pertinent practical issue. A remarkably large number of firms now provide gamification services, and investments are being made into gamification-related efforts. As any other hot marketing topic, gamification is discussed in length, for example, in the
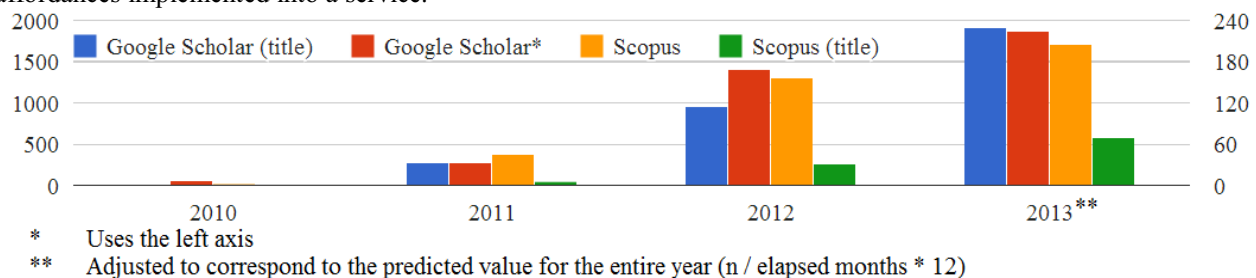

Figure 1. Search hits for "gamification"

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industry chatter, largely based on anecdotal and intuitive presumptions ranging from extremely negative to extremely positive perceptions. Thus, empirical results on the effectiveness of gamification are in demand.

This paper contributes to the understanding of gamification by reviewing the existing body of empirical research on the topic.

2. Conceptualizing gamification

Gamification has been defined as a process of enhancing services with (motivational) affordances in order to invoke gameful experiences and further behavioral outcomes [31][25]. In defining gamification, Huotari and Hamari [31] highlight the role of gamification in invoking the same psychological experiences as games (generally) do. Deterding et al. [9], on the other hand, emphasize that the affordances implemented in gamification have to be the same as the ones used in games, regardless of the outcomes (Figure 2). However, it is unclear which affordances are unique to games as well as which psychological outcomes can be strictly considered to stem from games. From the perspective of these definitions, there is room for a large variety of studies that could be framed as gamification. Therefore, one goal of this review is to explore what the actual empirical works on gamification have been studying as motivational affordances and psychological outcomes (as well as behavioral outcomes).

Nevertheless, conceptualizing gamification [31] in the manner presented here allows us to connect the concept to the literature on motivational affordances in IS research (see [44]), and further, break down the studies reviewed herein (Figure 2).
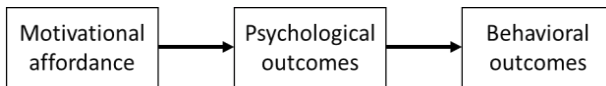

Figure 2. Gamification

According to this conceptualization, gamification can be seen to have three main parts: 1) the implemented motivational affordances, 2) the resulting psychological outcomes, and 3) the further behavioral outcomes. Therefore, in this review we focus on examining 1) what motivational affordances the reviewed studies have implemented as dependent variables, 2) what psychological outcomes have been measured as possibly both independent and dependent variables, as well as 3) what behavioral outcomes have been measured as dependent variables. Furthermore, we will investigate what services have been gamified,

and which methodologies have been used to study the effects.

3. Literature review

3.1. Step 1: General database search

Searches were made in the following databases: Scopus, ScienceDirect, EBSCOHost, Web of Science, ACM Digital library, AISel, Google Scholar, and Proquest. The search terms *gamification*, *gamif**, *gameful* and *"motivational affordance"* were used on all databases. The search terms were used for all fields (including title, abstract, keywords and full text), and all result types were included (Table 1). The middle column in Table 1 contains all results, including non-scientific writings such as magazine articles, trade publications etc. Thus, the figures in the column merely indicate the popularity of the subject.

Table 1. Results from searched databases

Library	Total number of results	Peer-reviewed papers*
EBSCOHost	399	17
Proquest	3423	124
Web of Science	56	56
Scopus	330	293
ScienceDirect	93	93
Google Scholar	3480	N/A
ACM Digital library	239	196
AISel	30	30
* The true number of peer-reviewed papers in some of the databases is lower than reported, as the results contain in some cases, for example, non-peer-reviewed short articles published in academic journals.		

3.2. Step 2: Focused searches

After the initial database searches to determine which databases provide results, focused searches in the databases were conducted. Focused searches were performed with the following preliminary criterion:
1) peer-reviewed full paper published in an international venue

After narrowing down the results to peer-reviewed studies, the following criteria were implemented and the search further refined by going through the results:
2) empirical study included
3) research methods are explicated
4) paper studies clearly identifiable motivational affordances

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5) the study was on gamification rather than on full games

The literature search proceeded with a screening of the different databases in the following order (the number in brackets indicates how many non-identical, new papers were found from each library): 1) ACM Library (13), 2) Scopus (5), 3) ScienceDirect (2), 4) AISel (2), and 5) Google Scholar (1). The rest of the databases provided previously found results. Most papers were published in various computer science/HCI conference proceedings. A few studies were specifically on gamifying learning and were published in venues such as Computer in Human Behavior and Computers and Education. Also, a few papers had been published in management information systems venues, such as Electronic Commerce Research and Applications, European Conference on Information Systems, and Management Science.

3.3. Step 3: Additional searches through references

We further investigated the references of the initially found papers and the references made to those papers. With this method, 1 paper not covered in the databases, yet highly relevant for the literature review, was discovered.

The papers in the literature search (Steps 3.2. and 3.3.) that did not satisfy the set criteria mostly divided into the following four categories:
1) conceptual papers
2) engineering papers describing a system being engineered (without evaluation)
3) gamification was mentioned in the text in passing and the actual substance was not gamification-related
4) short papers/research-in-progress/extended abstracts

After performing the three steps of the literature search, 24 peer-reviewed, empirical research papers on gamification were identified for the review. The full list of the chosen papers can be found in Appendix A.

3.4. Step 4: Analysis

In order to incorporate our discussion on the definition of gamification into our results, we combine the model of motivational affordances in ICT [44] with a modified version of the concept matrix presented by Webster and Watson [40] as a way of systematically collecting and analyzing the different motivational affordances and resulting outcomes.

The papers were analyzed and categorized based on the provided framework on gamification. The results of the analysis were gathered into a table (Appendix A).

4. Results

Altogether 24 empirical studies were examined in the literature review. Though not always explicitly stated, the high-level research question shared between the papers was: *Does gamification work*? The gamification implementations varied between the studies in terms of what game-like motivational affordances had been implemented (section 4.1.). Moreover, the measurement of effectiveness also varied from motivation and engagement-related psychological outcomes to use behavior-related outcomes (section 4.2.), and the studies yielded both positive and negative results (section 4.3.) in a wide variety of contexts (section 4.4.). The results were achieved using both quantitative and qualitative methods (section 4.5.). For a complete list on the details of reviewed studies, see Appendix A, where studies are further grouped based on the motivational affordance [44] categories.

4.1. Motivational affordances

In accordance with Webster and Watson [40], we collected and combined the different motivational affordances found in the studies into 10 different motivational affordance categories, based on the terminology used in the reviewed papers.

Table 2 indicates the relatively large variety of different elements tested in the empirical studies, although points, leaderboards, and badges [26] were clearly the most commonly found variants.

Table 2. Tested motivational affordances

Affordance	Included in the study
Points	[4][13][15][16][23][27][34][37][41]
Leaderboards	[4][10][13][15][16][21][23][27][37][41]
Achievements/ Badges	[2][8][10][17][20][22][25][27][34]
Levels	[11][15][16][21][27][37]
Story/Theme	[12][18][21][23][33][36]
Clear goals	[11][27][33][32]
Feedback	[4][11][21][27][32][33]
Rewards	[12][18][33][36]
Progress	[14][18][27][33]
Challenge	[4][13][18][21][23][27][33]

4.2. Psychological and behavioral outcomes

Table 3 shows that most of the studies examined behavioral outcomes. These studies mainly used experiments or statistical analyses from existing services or implementations designed by the researchers. Furthermore, use intentions were investigated through survey methods.

Studies investigating psychological outcomes mostly focused on aspects such as motivation, attitude and enjoyment. These studies used either evaluative interviews or questionnaires. Currently, only one study [27] has used validated psychometric measurements.

Table 3. Studied outcomes

Dependent variable	Paper
Psychological outcomes	[4][8][10][11][12][17][18][21][27][33][34][41]
Behavioral outcomes	[2][4][8][10][11][13][14][15][16][17][18][20][21][22][23][25][27][32][33][36][37]

4.3. Reported results

According to a majority of the reviewed studies, gamification does produce positive effects and benefits. Table 4 displays the reported findings of the quantitative studies. Most of the reviewed papers reported positive results for some of the motivational affordances of the gamification implementations studied. Only two studies found all of the tests positive.

Many of the quantitative papers were descriptive in nature. Naturally, descriptive papers are not inferential and, therefore, not able to infer about the effect of gamification per se. Thus, even though the implementations might have been received positively by the users, no actual effects are reported.

Regarding the partially positive results, studies did discuss why some of the expected results could not be established. For instance, the largest studies in the review ([25][32]) reported that gamification might not be effective in a utilitarian service setting, but instead engagement by gamification can depend on several factors, such as the motivations of users (see [29]) or the nature of the gamified system.

Complementary to the above findings, some studies showed that the results of gamification may not be long-term [25][15][16], but instead could be caused due to a novelty effect. However, it also seems that removing gamification might have detrimental effects [37] to those users who are still engaged by gamification, possibly due to loss aversion from losing e.g. earned badges and points [24].

The findings of the fully qualitative studies as well as the qualitative results of the mixed methods papers consisted of both positive and negative perceptions regarding the studied gamification implementations. Positive experiences from gamification (e.g. on engagement and enjoyment [34][11][33]) were reported in all of the studies. At the same time, however, the same aspects were most often disliked by some respondents in the study.

Table 4. Effects reported in quantitative studies

Results	Paper
All tests positive	[13][37]
Part of the tests positive	[8][10][12][14][15][16][18][22][23][25][27][32][33]
All tests not significant	-
Only descriptive statistics	[2][4][17][20][21][36][41]

4.4. Contexts of gamification

Context of gamification refers to the core service or an activity being gamified. As shown in Table 5, the range of contexts where the studies were performed was wide. Gamification of education or learning was the most common context for the implementations. Most of the papers gamifying work were conducted in crowdsourcing systems.

All of the studies in education/learning contexts considered the learning outcomes of gamification as mostly positive, for example, in terms of increased motivation and engagement in the learning tasks as well as enjoyment over them. However, at the same time, the studies pointed to negative outcomes which need to be paid attention to, such as the effects of increased competition [22], task evaluation difficulties [10], and design features [11][10].

Three out of four studies which studied intra-organizational systems, investigated the gamification of the same IBM's Beehive system at different stages [15][16][37]. The main results from these studies indicate that gamification has a positive effect on some users for a short time [16].

Surprisingly, none of the studies were explicitly conducted in a marketing context (perhaps excluding [25][12]), although gamification has been especially touted as a potential marketing strategy. However, if we look at the dependent variables across the studies, they largely pertain to the increase in and quality of the service/system use, which are considered as highly important marketing metrics. Thus, the results of the studies suggest implications for managerial and business purposes regarding effects on engagement and

use activity. However, no paper seemed to infer about the relationship between gamification and purchase behavior.

Table 5. Contexts of the studied implementations

Context	Paper
Commerce	[25]
Education/learning	[4][8][10][11][17][22][23][33][36]
Health/exercise	[27]
Intra-organizational systems	[14][15][16][37]
Sharing	[34]
Sustainable consumption	[21]
Work	[2][13][18][20]
Innovation/ideation	[32][41]
Data gathering	[12]

4.5. Types of studies

Table 6 reports the types of studies based on the methodology used in the study. As indicated in Table 6, most of the studies were quantitative. Fully qualitative studies were in the minority. The review indicates that the research on gamification has currently focused on using usage data and inferring about user behavior directly.

Table 6. Types of studies

Method	Paper
Qualitative*	[11][34]
Quantitative**	[2][4][8][10][12][13][14][17][18][20][22][25][27][32][36][37][41]
Mixed methods***	[15][16][21][23][33]
* including interviews and other qualitative observations ** including experiments, log data analyses and quantitative questionnaires. *** usually include a larger quantitative part and, for example, user interviews or forum discussion analyses	

5. Discussion

In this paper, the current efforts in empirical study of gamification have been broken down into components in order to structurally analyze the results and state of the research. A conceptual framework for gamification based upon the 1) motivational affordances, 2) psychological outcomes, and 3) further behavioral outcomes was provided and the studies categorized on the basis of the framework.

Answering the question posed in title of the paper, *Does gamification work?*, the literature review suggests that, indeed, gamification does work, but some caveats exist. The majority of the reviewed studies did yield positive effects/results from gamification. However, as can be seen from Table 4, most of the quantitative studies concluded positive effects to exist only in part of the considered relationships between the gamification elements and studied outcomes. Further, the studies that investigated gamification qualitatively revealed that gamification as a phenomenon is more manifold than the studies often assumed. These observations suggest that some underlying confounding factors exist. Most prominently, the studies bring forth two main aspects: 1) the role of the context being gamified, and the 2) qualities of the users. We discuss these issues in more detail in the sub-section on further research avenues (section 5.2.).

The literature review also revealed that more rigorous methodologies ought to be used in further research on gamification. Methodological limitations and suggestions for avoiding the pitfalls of current studies in future research are presented (section 5.1.).

The limitations of this review are also considered in section 5.3.

5.1. Methodological limitations in the reviewed studies

Several shortcomings could be identified during the literature review: 1) the sample sizes were small in some studies (around N=20), 2) proper, validated psychometric measurements were not used (when surveying experiences and attitudes), 3) some experiments lacked control groups and relied solely on user evaluation, 4) controls between implemented motivational affordances were often lacking and multiple affordances were investigated as a whole (i.e. no effects from individual motivational affordances could be established), 5) many presented only descriptive statistics although they could have easily also inferred about the relationship between constructs, 6) experiment timeframes were in most cases very short (novelty might have skewed the test subjects' experiences in a significant way), and 7) there was a lack of clarity in reporting the results. 8) No single study used multi-level measurement models including all motivational affordances, psychological outcomes, and behavioral outcomes. Further studies should especially try to avoid these pitfalls in order to refine the research on gamification.

5.2. Avenues for future research

The present studies on gamification and motivational affordances suggest that the context of the service might be an essential antecedent for engaging gamification. In some of the reviewed studies, similar considerations were expressed (e.g. [37][34][25]). For example, Hamari [25] suggested that services oriented towards strictly rational behavior, such as e-commerce sites, might prove to be challenging systems to be gamified as the users could be geared towards optimizing economic exchanges.

Triangulating from self-determination theory [7] as well as from the traditional definitions of games [3], both suggest that outside pressures (such as extrinsic rewards) undermine intrinsic motivations (see e.g. [6]) and hence would in essence undermine gamification which is an attempt to afford for the emergence of intrinsic motivations.

The understanding of the contextual factors would benefit from considering the following theoretical perspectives: (1) the social environment: theory of planned behavior [1] states that the voluntariness of carrying out a task is one of the main antecedents for attitude formation and behavior; (2) the nature of the system: is the system in question utilitarian or hedonic in nature [5][39]; and (3) the involvement of the user: is it cognitive or affective in nature [43].

The impact of the context of the gamified system could be examined by experimental conditions. By implementing certain motivational affordances and holding them constant while varying the nature of the underlying service could give insight into how the context affects the outcomes of the gamification.

Furthermore, in many of the reviewed papers, user qualities were believed to have an effect on attitudes towards gamification [25][13][27][34], thus explaining why in certain environment or only with certain users, gamification had significant effects. As previous works on player motivations suggest, people in fact interact with game-like systems in different manners, and for different reasons [29][42][38]. Thus, the experiences created by the gamifying motivational affordances are also likely to vary [31].

Eickhoff et al. [13] mention the emergence of distinct "worker types" in their service, which gamified crowdsourced relevance assessments. In addition, the series of studies done on gamifying IBM's Beehive social networking service [15][16][37] also note that the users fell into distinct behavioral patterns: for example, some users wanted to be at the very top of the leaderboard, while for others it was enough to simply appear on the leaderboard, regardless of ranking.

Hamari [25] suggests that sporadic nature of usage might not be compatible with persistent gameful affordances as the users might not spend enough time within the service in order to become interested in them.

Furthermore, the freeform feedback collected from the participants in several of the studies contained isolated comments where certain motivational affordances (which otherwise received positive comments) were felt as negative (such as ones encouraging competition), lending credence to the idea that different player types experience the same affordances differently [31].

5.3. Limitations of this literature review

Gamification as an academic topic of study is relatively young, and there are few well-established theoretical frameworks or unified discourses. In this literature review, only studies explicitly concerned with gamification and motivational affordances were included. Thus, the paper is limited with regards to reporting research that has been done on other subjects conceptually or theoretically close to gamification (e.g. studies on intrinsic motivations) or similar with regards to measured outcomes. Also, there are potentially studies that investigate similar phenomena, but discuss it with different terms, and thus, were difficult to find. Here we relied on the selection criteria where the empirical papers were clearly studying the effects of implementation of game-like mechanics. Therefore, the present paper provides a close look on the research being done on the topic of gamification particularly.

Since the motivational affordances, behavioral/psychological outcomes as well as the methodologies varied greatly between the studies, formal meta-analysis [30] could not be conducted. Furthermore, many of the studies used qualitative methods. As the research on gamification progresses, care should be taken to ensure that future results are more comparable. This can partly be ensured if future studies will build upon the previously well executed inferential studies with either proper experiments or proper psychometric measurements and adequate samples, such as [25][15][27][32][8].

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Appendix

Appendix A. Studied motivational affordances and psychological/behavioral outcomes

Paper	Core service / activity	Motivational category	Motivational affordances	Psychological outcomes	Behavioral outcomes	Results	Type of study	Methods used in study	N	Source
[2]	Question and answer website	Cognitive	Badges		Site participation, steering behavior	-	Quantitative	Statistical analysis	n/a	ACM
[4]	Multiple choice quiz software tool	Cognitive, social, emotional	Points, feedback, leaderboard, time constraints (challenge)	Enjoyment, engagement	Impact on learning (usefulness)	-	Quantitative	Implementation, questionnaire	76	AISel
[8]	Online learning tool	Cognitive	Badges	Enjoyment, attitude towards badges	Level of participation and quality of participation	Partially positive	Quantitative	Implementation, experiment, questionnaire	1031	ACM
[10]	E-learning platform	Cognitive, emotional, social	Leaderboard, badges	Attitude towards gamification	Learning outcomes	Partially positive	Quantitative	Implementation, experiment	195	ScienceDirect
[11]	Learning to use Adobe	Cognitive	Clear goals, challenge,	Engagement, fun	Effectiveness of learning	-	Qualitative	Implementation, interviews	11	ACM

			feedback, levels, story/theme							
Photoshop										
[12]	Survey	Cognitive, emotional	Narrative, avatars (story/theme), rewards	Satisfaction, engagement	Response patterns	Partially positive	Quantitative	Implementation, experiment, survey	1007	ScienceDirect
[13]	Crowdsourced document relevance assessments	Cognitive, social	Points, leaderboard, challenge	Intrinsic vs. extrinsic motivation to complete tasks	Quality of completed tasks, task completion speed	Positive	Quantitative	Implementation, experiment, analysis of use data	795	ACM
[14]	Community-based course recommender system	Cognitive	Progress		Amount of content contributed	Partially positive	Quantitative	Implementation, experiment	161	Scopus
[15]	A company's internal social networking system	Cognitive, social	Points, levels, leaderboards		Amount of content contributed / users contributing	Partially positive	Mixed methods	Implementation, experiment, analysis of use data, forum discussion analysis	421	Through references
[16]	A company's internal social networking system	Cognitive, social	Points, levels, leaderboards		Amount of content contributed, type of content distributed (in relation to their point value), individual users' contribution amounts	Partially positive	Mixed methods	Implementation, experiment, analysis of use data, interviews	6/n/a	ACM
[17]	A mobile information application for new university students	Cognitive, emotional	Achievements, clear goals	Perceived added value of gamification, fun	Exploration of the campus while interacting with the application	-	Quantitative	Implementation, questionnaire	26	ACM
[18]	Various calibration tasks	Cognitive	Challenge, progress bar, story/theme, levels, rewards	Enjoyment of gamified activity	Quality of collected calibration data	Partially positive	Quantitative	Implementations, survey	12	ACM
[20]	Question and answer website	Cognitive	Badges		Behavior change due to receiving badges	-	Quantitative	Statistical analysis	4/n/a	ACM
[21]	Conserving energy in homes	Cognitive, social	Story/theme, challenge, levels, feedback, leaderboards	Social motivation	Change in relative energy consumption	-	Mixed methods	Implementation, analysis of use data, interviews	6	ACM
[22]	Online learning environment	Cognitive	Badges		Impact on time management, carefulness and achieving learning goals	-	Quantitative	Implementation, experiment	281	Scopus
[23]	Virtual human patients for training healthcare	Cognitive, emotional	Leaderboard, narrative (story/theme), deadline	Difference in users' approach to virtual patient	Number and duration of interactions with virtual	Partially positive	Mixed methods	Implementation, experiment, examination of initial responses	20, 10 in control group	ACM

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	students		(challenge)	interaction	patients, likelihood of voluntary participation to a virtual patient interaction					
[25]	Peer-to-peer trading service	Cognitive, social	Badges, clear goals	Social comparison, clear goals	Amount and quality of user activities	Partially positive	Quantitative	Implementation, experiment, 2x2-design, analysis of use data	3234	Scopus
[27]	Gamified exercise social networking service	Social, emotional	Badges, leaderboards, levels	Network effects, social influence, recognition, reciprocal benefits, attitude towards the service	Intentions to use, intentions to recommend	Partially positive	Quantitative	Survey, psychometric and econometric measurement, structural equation modelling	107	AISel
[32]	Computer-mediated idea generation environment	Cognitive	Goals, feedback		Performance (in idea generation)	Partially positive	Quantitative	Implementation, experiment, 2x2-design	260	Scopus
[33]	Learning to use AutoCAD	Cognitive	Story/theme, clear goals, feedback, challenge, rewards	Engagement, enjoyment	Task performance	Partially positive	Mixed methods	Implementation, analysis of use data, interviews	14	ACM
[34]	Mobile photo sharing service	Cognitive	Achievements, points	Motivation		-	Qualitative	Implementation, experiment, interviews	20	ACM
[36]	Library service and library orientation	Cognitive	Story/theme, rewards		Increasing knowledge about the library, its services and resources, teaching library skills	Partially positive	Quantitative	2 implementations, surveys	388/52	Scopus
[37]	A company's internal social networking system	Cognitive, social, emotional	Removal of game elements (points, leaderboard, levels)		Total number of contributions of various content types	Positive	Quantitative	Implementation, experiment, analysis of use data	3486	ACM
[41]	Online idea competition	Cognitive, social	Points, leaderboards	Motivation, degree of happiness, flow, enjoyment, task involvement		-	Quantitative	Implementation, online survey	30	Google Scholar

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