International Journal of Game-Based Learning
Volume 8 • Issue 3 • July-September 2018

A Systematic Review of Gamification Research:
In Pursuit of Homo Ludens

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ABSTRACT

Gamification is an innovative approach that aims to increase users' engagement and motivation and provide sustainable experiences. It has recently become widely known and is an approach that is being used in many fields. This article intends to identify and map trends and patterns in gamification research. For this purpose, this article employs a systematic review in which document and content analysis were used. Research findings have revealed that conceptual/descriptive papers outweigh other type of papers; however, quantitative and qualitative papers are showing an increasing trend. Lexical analysis demonstrated that education, teaching, and learning; engagement, motivation, and behavior change, and gamified designs, are emerging concepts. Keyword analysis revealed that gamification, engagement, and motivation are most frequently used keywords. Gamification articles are mostly related to the education field. Self-Determination Theory, Flow Theory, and MDA (Mechanics, Dynamics, and Aesthetic) Framework appeared to be the most beneficial lenses in gamification studies.

KEYWORDS

Gameful Design, Gamification, Gamified Learning, Research Trends, Systematic Review

INTRODUCTION

Gamification is defined as "the use of game design elements in non-game contexts" (Deterding, Dixon, Khaled & Nacke, 2011, p.10). Another definition described it as "the process of game-thinking and game mechanics to engage users and solve problems" (Zichermann & Cunningham, 2011, p.xiv). There are many other aligned terms of gamification, such as productivity games, surveillance entertainment, funware, playful design, behavioral games, game layer, and applied gaming; however, gamification is the term that is widely accepted in related literature. Though it was first used for marketing purposes, it has been used in many other fields, including education, health, business, and management. The basic purpose for using gamification is to increase users' motivation to provide more effective, efficient, engaging, enduring and entertaining experiences. In other words, the main goal of the gamification is to keep the users, that is to say players, in the game.

Gamification was first introduced as a novel idea in 2008; however, its acceptance and popularity, from 2010 onwards, attracted much attention. Google Trend analysis for keywords 'gamification,

DOI: 10.4018/IJGBL.2018070102

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gamify, and gamified" confirms this claim and also demonstrates how interest for gamification has increased since 2010 and continues steadily (Figure 1).

Gamification was also tracked in Gartner's Hype Cycle of Emerging Technologies (Gartner, 2016). Gamification was first spotted in the Technology Trigger Cycle in 2011 and the Peak of Inflated Expectation Cycle in 2012 and 2013, and finally in the Trough of Disillusionment Cycle in 2014. It was seen in the Trough of Disillusionment Cycle in Gartner's Hype Cycle of Digital Marketing in 2015 (Figure 2). It is thought that currently gamification has been maturing, so as to climb onto the Slope of Enlightenment Cycle, where gamification can benefit the enterprise, start to crystallize and become more widely understood, before it reaches the Plateau of Productivity Cycle where mainstream adoption occurs.

In an interview, Marczewski stated that "gamification is the process of improving systems and people's experiences using lessons, techniques, and elements taken from games" and part of game-based solutions which can be defined as 'game thinking' (Bozkurt, 2017, para.3). In other words, game-based learning and gamification are two intertwined research areas and exploration of one

Figure 1. Google Trends for gamification

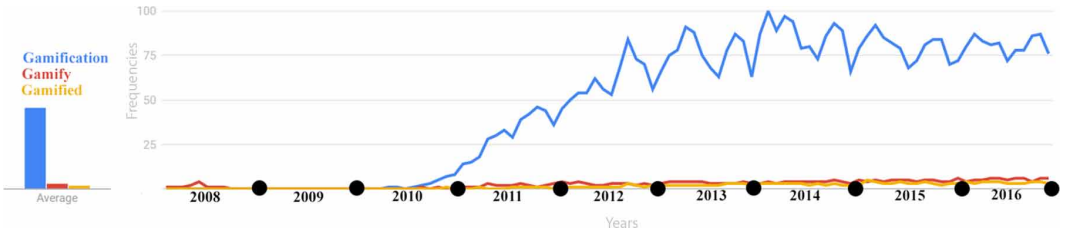
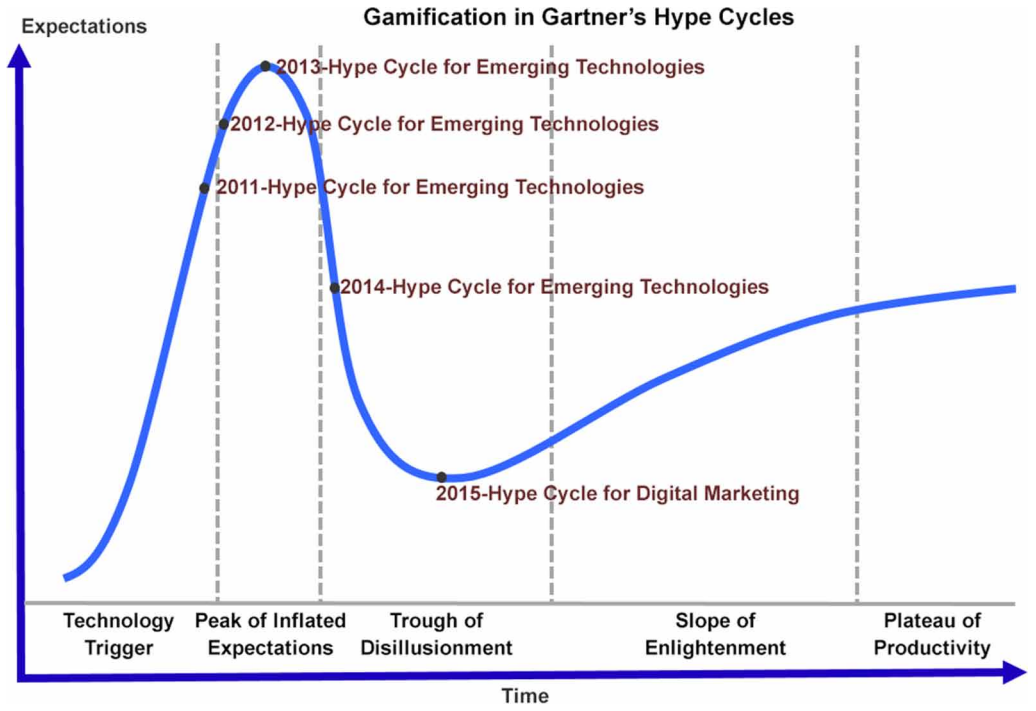


Figure 2. Gamification in Gartner's Hype Cycle of Emerging Technologies



field improves the other one. In this regard, this study intends to contribute to the field by examining research on gamification in empirical publications.

HOMO LUDENS, GAME, AND PLAY

Huizinga (1938) opened an interesting research avenue when he indicated the power of game and play in his seminal work, *Homo Ludens,* which means playing man. He stated that a game "is an activity which proceeds within certain limits of time and space, in a visible order, according to rules freely accepted, and outside the sphere of necessity or material utility. The play-mood is one of rapture and enthusiasm, and is sacred or festive in accordance with the occasion. A feeling of exaltation and tension accompanies the action, mirth and relaxation follow" (Huizinga, 1938, p.132). Even though this definition was suggested as long time ago, it reveals the most important aspects of games: gratuitousness, enjoyment, rules, and the absence of a purpose (Kickmeier-Rust, 2009). For Homo Ludens, there are two basic terms: game and play. Accordingly, it explains that game and play constitute a continuum, where one side represents *paidia* (playing: unstructured and spontaneous activities: playfulness) and other side represents *ludus* (gaming: structured activities with explicit rules: game) (Caillois, 2001). The present study intervenes at this point and intends to explore homo ludens' perception of paidia, ludus, and gamification, by examining empirical papers on gamification.

PURPOSE OF THE RESEARCH

Based on the discussions above, the main purpose of this research is to identify and map trends in gamification studies. In this regard, by focusing gamification studies from 2008 to 2016, the research provides an overall outlook and explores the following research questions:

- What is the most preferred research method and model in gamification studies?
- What are the patterns in the titles and abstracts of the gamification studies?
- What are the patterns in the keywords of the gamification research studies?
- What are the most used theoretical/conceptual frameworks in gamification studies?
- What are the most cited references in gamification studies?

RELATED LITERATURE

The papers that reviewed gamification studies were clustered into four groups. These are papers with holistic perspectives, those focused on theoretical/conceptual frameworks, bibliometric/citation analysis, and papers with specific investigations.

Reviews That Have Holistic Perspectives

Hamari, Koivisto, and Sarsa (2014) reviewed 24 peer-reviewed empirical papers on gamification published between 2010 and 2013. Their review revealed that while gamification has positive effects, these effects are dependent on the context in which the gamification is being implemented, as well as on the users using it. They reported that the most employed methodologies were quantitative, mixed methods and qualitative approaches, respectively. They noted that a great majority of the studies were carried out from an educational perspective.

Thiebes, Lins, and Basten (2014) investigated 29 papers published between 2010 and 2013 to reach a synthesis of gamification mechanics and dynamics. Their research yielded a synthesis of mechanics and dynamics in five clusters: system design, challenges, rewards, social influences and user specifics. They also suggested that in order to successfully integrate gamification into

information systems, organizations should recognize that gamification is more than a buzzword requiring meaningful designs.

Caponetto, Earp, and Ott (2014) analyzed around 120 gamification papers published between 2011 and 2014. They found that a great majority of gamification papers originated from the USA (24%), where the term gamification was coined. In their analysis of the abstracts of the sampled papers, they found that gamification is usually linked to the following terms: increase and improve; motivate/motivation and engage/ment; school and courses, and finally social and design. The targeted population in gamification papers was university students (43%); in other words, young adult learners.

Schlagenhaufer and Amberg (2015) investigated 34 papers published in journals and conferences between 2008 and 2013. They reported that gamification was mostly applied to the field of education. The most frequent gamification elements in the sampled studies were points, badges, and leaderboards. Accepted as a synonym term in their research, quantitative questionnaires and surveys were typically used as data collection tools.

Dicheva, Dichev, Agre and Angelova (2015) examined 34 papers published between 2011 and 2014 that covered game elements in educational contexts. They reported that the most used gamification design principles in the educational context are visual status, social engagement, freedom of choice, freedom to fail, and rapid feedback, while the most popular game mechanisms are points, badges, and leaderboards.

Reviews That Focused on Theoretical/Conceptual Frameworks

Seaborn and Fels (2015) conducted a systematic deductive analysis of the concept of gamification and a review of applied human participants research on computer-mediated gamification systems. In their study, they reported the outlining theoretical/conceptual frameworks used in gamification research. They further reported that primarily there is a lack of adherence to the emerging standard definition of the term "gamification." Secondly, theoretical foundations are inconsistently referenced and interpreted. Thirdly, there is a gap between theory and practice – where theory is empirically unexamined and applied work lacks reference to theory – which serves to limit the growth of the field as a whole. Fourthly, there is a pressing need for empirical studies that employ comparative and/or longitudinal designs to validate what effect and the extent of the effect gamification features have on the participants' performance and enjoyment, as well as to identify best practices. Researchers also reported that while applied gamification research is found across a number of domains, the survey findings suggest that it is largely that of education and to a lesser extent the domains of health and wellness, online communities, crowdsourcing, and sustainability. The gamification frameworks/concepts analyzed in this study are as follows:

- Self-Determination Theory
- Intrinsic and Extrinsic Motivation
- Situational Relevance
- Situated Motivational Affordance
- Universal Design for Learning
- User-centered Design
- Transtheoretical Model of Behavior Change

Mora, Riera, González and Arnedo-Moreno (2015) reviewed 18 gamification frameworks. They reported that most of the frameworks are based on Human-Focused Design principles, taking into account the person as the main goal of the design. Psychological aspects are very common items of great importance and highly significant in most of the frameworks proposed. Among the reviewed gamification frameworks, only a couple of them focused on a technological-based or goal-based design in contrast to the main human-based design. The gamification frameworks/concepts analyzed in this study are as followings:

- Self-Determination Theory
- A Framework for Success
- Six steps to Gamification
- Gamification Framework
- Gamification Design Process
- Steps to Gamification
- Robinson and Bellotti taxonomy
- Francisco-Aparicio et al. framework
- A moral framework for taking responsibility
- Octalysis: Complete Gamification Framework
- A Framework for Sustainable Gamification Impact
- Player Centered Design Methodology
- Role-Motivation-Interaction Framework
- Gamification Framework model
- A framework for gamification suited for marketing
- Theoretical Model for Gamification in Workplace IS context
- A Framework for Designing Gamification in the Enterprise
- Gamification Model Canvas
- Gamification development process

Reviews That Focused on Bibliometric/Citation Analysis

Harman, Koohang, and Paliszkiewicz (2014) conducted a citation network analysis with a purpose of exploring changes in scholarly interest on the topic of gamification. They examined citations in papers published between 2010 and 2013 and reported that "other" category publications (books, proceedings, etc.) will have a significantly larger frequency when compared with "journal" publications than is expected for emerging fields such as gamification. It is thought that because gamification was a new concept by 2010, researchers usually preferred publication venues such as conference proceedings because they require shorter publication processes. Highlighting that citation networks are dynamic, they noted that the citation network in 2010 was sparse; however, in 2011 the citation network began to grow rapidly, and the citation network developed in 2012 and 2013.

Martí-Parreño, Méndez-Ibáñez, and Alonso-Arroyo (2016) examined the use of gamification in education through a bibliometric and text mining analysis. They sampled 139 articles published in top journals over between 2010 and 2014 and found that there is an increasing academic interest in gamification and a wide variety of constructs that were clustered in four main themes: effectiveness, acceptance, engagement and social interactions.

Reviews That Had Specific Focuses

Azmi, Iahad, and Ahmad, (2015) examined papers published between 2011 and 2015 on gamification in online collaborative learning for programming courses. In their research, they concluded that gamifying learning activities are an effective solution to encourage students to interact and engage with the learning process.

Darejeh and Salim (2016) examined 78 papers published between 2008 and 2014 to explore existing gamification solutions targeted at solving user engagement problems in different categories of software. They reported that most of the studies focused on educational and social software, which were developed for web or mobile platforms.

Ortiz, Chiluiza, and Valcke (2016) presented a systematic review of 30 papers published between 2011 and 2015 on gamification in Higher Education within a STEM context. They reported that computer science courses dominate the STEM field, while areas such as math, chemistry, and science have a minor presence. Most studies used a combination of gamification elements. These are usually points, badges and leaderboards, and other elements, including challenges, levels, avatar, etc.

Johnson, Deterding, Kuhn, Staneva, Stoyanov and Hides (2016) reviewed 19 gamification papers published between 2012 and 2015 on health and wellbeing perspectives. They revealed that gamification could have a positive effect on health and wellbeing, especially when applied in a skilled way.

There are some issues that are salient in these review studies. First of all, gamification literature has a tendency to focus on education, especially e-learning practices (Caponetto et al., 2014; Dicheva et al., 2015; Seaborn & Fels, 2015; Mora et al., 2015; Martí-Parreño, 2016). Secondly, there is a terminological confusion, which derives from the similarity of the word 'game' in game-based learning and gamification (Caponetto et al., 2014; Schlagenhaufer & Amberg, 2015; Seaborn & Fels, 2015; Martí-Parreño, 2016). Thirdly, Self-Determination Theory is mostly used as a theoretical background in gamification studies (Seaborn & Fels, 2015; Mora et al., 2015). Then, gamified design and gamification mechanics, dynamics and components are usually covered in gamification literature (Thiebes et al., 2014; Azmi et al., 2015; Schlagenhaufer & Amberg, 2015; Dicheva et al., 2015; Seaborn & Fels, 2015; Mora et al., 2015; Martí-Parreño et al., 2016). Finally, gamification is perceived as a source of motivation, engagement and sustainability.

METHODOLOGY

This section of the study explains research method; sampling, inclusion and exclusion criteria; reliability; limitations, strengths, and significance of the study.

Research Method

This study employs systematic review to reach a complete view of gamification research. This type of study is helpful to identify trends of knowledge development and synthesize a stream of research (van Doren & Heit, 1973). Systematic reviews are also known as research synthesis. It has three basic stages: It starts with identifying and describing relevant research, and then it continues by examining identified research, and finally it synthesizes and reports research findings systematically (Gough, Oliver & Thomas, 2012). During these processes, this study also benefited from documents analysis and content analysis.

In the first stage, where relevant gamification research was identified and described, the study used documents analysis. Document analysis is a technique that includes approaches such as skimming (superficial examination), reading (thorough examination), and interpretation (Bowen, 2009). In this study, document analysis was used to construct a research corpus by skimming and reading identified gamification research.

In the second stage, where identified gamification research was examined, the study used content analysis. Content analysis, which is a technique based on explicit rules of coding (Berelson, 1952), can be used to make inferences, interpretations, counting, summarizing, or categorization of the different types of the content (Orcher, 2005; Wilson, 2011). In this study, content analysis was used to count and summarize a sheer volume of textual content into meaningful categories.

Sampling, Inclusion and Exclusion Criteria

The articles were sampled according to the identified inclusion criteria. Accordingly, inclusion criteria for the research are defined as followings:

- articles that were published between 2008 and 2016
- peer-reviewed
- written in English
- had online full-text accessibility
- had predefined keywords (gamification, gamify, gamified) in the titles

Articles that are irrelevant and do not have online full-text access were excluded from the research corpus.

Multiple databases were used in screening gamification research (e.g.: Scopus, Eric, Web of Science, and Google Scholar). However, it was found that Google Scholar provided a diverse type of studies (books, magazine articles, conference papers etc.) and Scopus already cover articles provided by Eric and Web of Science. Therefore, the researchers first collected articles using defined keywords in Scopus and then conducted discrete inquiries for each year span (from 2008 to 2016) in Google Scholar. Though gamification became widely known in DICE Summit (Design, Innovate, Communicate, Entertain Summit) by 2010, the year 2008 selected as a start point because the term 'gamification' was documented for the first time in that date. As a result, a total of 208 articles (Figure 3) that meet inclusion criteria of the research were sampled for this study.

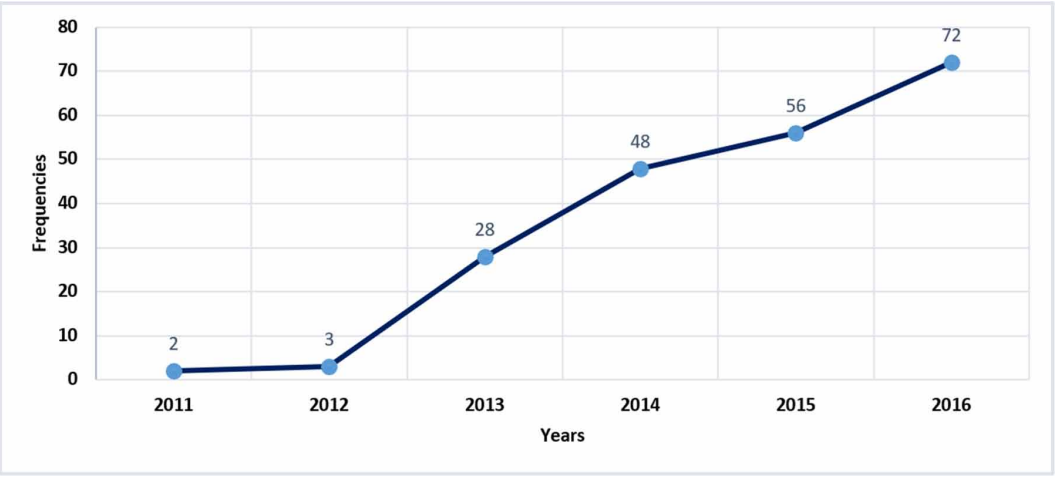
Reliability

In the first phase, articles that were included in the research corpus were coded according to preset categories. After completing the coding process, another researcher recoded the same articles in the second phase. Following these phases, the results were compared and categories that were different from each other were examined again. The categories that did not match were defined according to examination in the third phase and these categories were only coded when the researchers arrived at a consensus. In the fourth phase, an independent researcher who has experience in systematic reviews and gamification recoded research methodology, model and field categories, calculated inter-rater reliability. Inter-rater reliability of the final coding was found to be $\kappa = .93$. Altman (1991) proposed that Cohen's kappa values from 0.81 to 1.00 qualify as very good; thus, the reliability of the study is considered as very good.

Limitations, Strengths, and Significance of the Study

The findings of this study are limited to articles published in academic journals. These articles were selected according to inclusion criteria explained above. In addition to limitations, the strengths of the study lie in the number of the sampled articles. The previous research that attempted to map research trends examined articles that ranged from 18 to 120. However, this study sampled 208 articles that met the inclusion criteria through an open search and thus offers an overall picture of gamification research.

Figure 3. The distribution of sampled articles by year



Despite the increasing interest on the gamification, it is still vague on what has been researched. In this regard, this study is significant in terms of identifying the current state of the art in gamification research. In order to achieve a more holistic snapshot, the research examines gamification studies from multiple perspectives with an aim to reach a complete snapshot of the period from 2008 to 2016. In addition to identifying trends, it also reveals gaps in gamification research, which is important to improve the field and construct the pillars of gamification research.

FINDINGS AND DISCUSSION

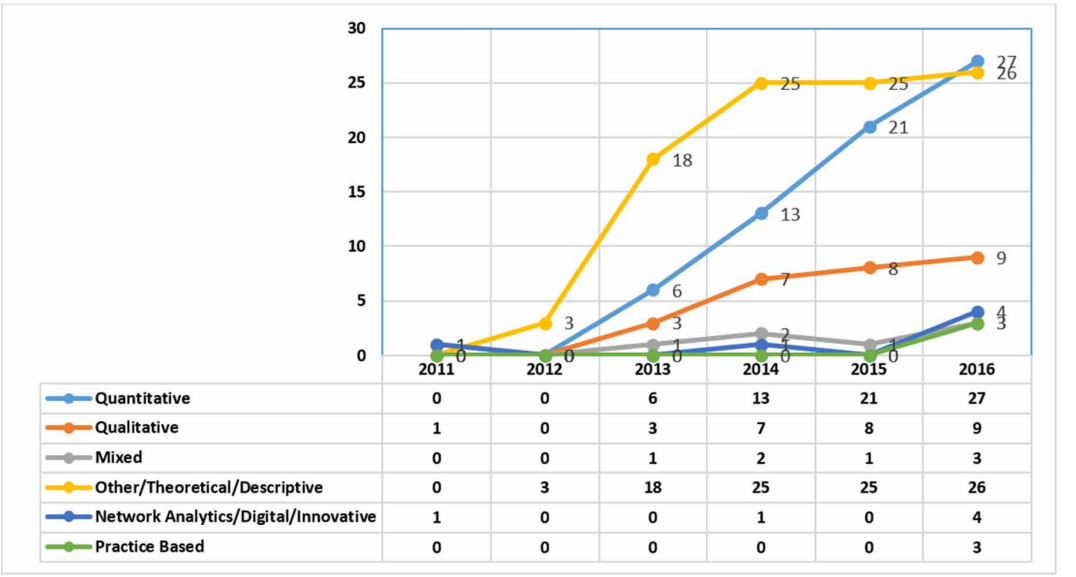
This section of the research provides identified trends on gamification research (research method and model/design) and emerged patterns (lexical analysis, keywords analysis, related fields, most used theoretical/conceptual frameworks, and citation analysis).

Research Methodology

The schema proposed by Bozkurt, Akgun-Ozbek, and Zawacki-Richter (2017), which categorizes research methods as quantitative, qualitative, mixed, conceptual/theoretical/other, data mining and analytics, and practice based, was used in the research. The rationale to adopt this schema is that the schema covers new emerging methodological approaches as well as traditional ones. Accordingly, the mostly used research methodology is conceptual/descriptive type of articles (n= 97; 46.63%). Other methods that were mostly used are quantitative (n= 67; 32.21%), qualitative (n= 28; 13.46%), mixed (n= 7; 3.37%), data mining and analytics (n= 6; 2.88%), and practice-based (n= 3; 1.44%) (Figure 4).

It was seen that as a novel idea, most of the gamification articles mostly adopted conceptual/descriptive methodology. Though it is natural to see such a trend for an emerging field, the dominance of this type of methodology can undermine the gamification field, as it needs empirical findings to improve the field and fortify the pillars of gamification field. It is also noteworthy that the number of this type of articles stops increasing by 2014, while other type of methodologies had gained an increasing momentum by 2013. It was also seen that there is a significant increase in the number of quantitative and qualitative research from 2013 to 2016. Though few in number,

Figure 4. Distribution of research methodologies by year



	2011	2012	2013	2014	2015	2016
Quantitative	0	0	6	13	21	27
Qualitative	1	0	3	7	8	9
Mixed	0	0	1	2	1	3
Other/Theoretical/Descriptive	0	3	18	25	25	26
Network Analytics/Digital/Innovative	1	0	0	1	0	4
Practice Based	0	0	0	0	0	3

it is also promising to see other type of methodologies such as mixed, data mining and analytics, and practice-based methodologies.

Even though there is an absence of the conceptual/descriptive type of methodology in the following studies, the trend in qualitative, quantitative and mixed research accord with the findings of this research. Ortiz, Chiluiza and Valcke (2016) reported that, articles in their sampling (n= 30) used quantitative (n= 24; 80%) mixed (n= 4; 6.66%), and qualitative (n= 2; 13.33%) methodologies. In Hamari, Koivisto and Sarsa's (2014) sampling (n= 24), quantitative (n= 17; 70.83%), mixed (n= 5; 20.83%), and qualitative (n= 2; 8.33%) approaches were identified as mostly used methodologies. Martí-Parreño, Méndez-Ibáñez and Alonso-Arroyo (2016) also reported that 80% of the studies in their sampling (n= 139) used a quantitative approach while 13% used a qualitative approach and 7% a mixed-methods approach.

Research Model/Design

The findings related to research model and designs (Figure 5) revealed that literature reviews (32.7%), experimental studies (11.5%), correlational studies (10.6%), survey studies (9.6%) and case studies (8.7%) are mostly preferred research model/designs. However, it should be noted that the number of the descriptive studies (e.g. literature reviews) is steady while the number of empirical studies (e.g. experimental, correlational studies) has an increasing trend.

Figure 5. Cross tabulation of research models/designs

Paradigm			Years							
Method	%	Model/Design	2011	2012	2013	2014	2015	2016	TOTAL	%
Quantitative	32,21%	Survey			3	3	4	10	20	9,6
		Correlational			2	7	6	7	22	10,6
		Experimental			1	3	11	9	24	11,5
		Meta-analysis							0	0,0
		Causal comparative							0	0,0
Qualitative	13,46%	Decriptive				2	3	4	9	4,3
		Case Study	1		3	4	5	5	18	8,7
		Ethnography				1			1	0,5
		Phenomenology							0	0,0
		Grounded theory						1	1	0,5
		Narrative							0	0,0
		Content Analysis							0	0,0
		Meta-Synthesis							0	0,0
		Delphi							0	0,0
		Historical							0	0,0
		Heuristic							0	0,0
		Discourse analysis							0	0,0
Mixed	3,37%	Explanatory sequential				2	1	1	4	1,9
		Exploratory sequential			1			1	2	1,0
		Convergent parallel						1	1	0,5
		Embedded							0	0,0
		Multiphase							0	0,0
		Transformative							0	0,0
Conceptual / Descriptive / Other	46,63%	Literature review		2	10	16	19	21	68	32,7
		Position paper			1	1		1	3	1,4
		Opinion paper		1	1	2			4	1,9
		Report			5	1	2	1	9	4,3
		Field notes				1			1	0,5
		Comparative				1			1	0,5
		Reflection paper				1			1	0,5
		Systematic review				1	3	2	6	2,9
		Technical papers			1	1	1	1	4	1,9
Data Mining and Analytics	2,88%	Log analysis	1					2	3	1,4
		Social network analysis				1		2	3	1,4
		Learning analytics							0	0,0
		Text (data) mining							0	0,0
		Internet and traffic ranks							0	0,0
Practice Based	1,44%	Design-based research							0	0,0
		Action research						3	3	1,4
Total			2	3	28	48	55	72	208	100

Every research methodology, model or design has its own value and must not prevail upon one another. However, as an emerging field, gamification needs to have research from different methodological perspectives to climb onto the Slope of Enlightenment Cycle (Figure 2) and emerge as an innovative field, forged, fortified and confirmed by empirical research findings. The trend in the current state of art in research methodology, model, and design perspectives, demonstrates that gamification research has been still maturing and there is a need for more empirical studies to climb into the Slope of Enlightenment Cycle and then to reach to Plateau of Productivity Cycle in Gartner's Hype Cycles. In addition to thoughts regarding methodological aspects, it is believed that the field will mature when greater critical analysis is brought to bear on the topic. It is not a mere matter of efficiency, effectiveness, and motivation. Consideration must also be given to who uses gamification for what ends; this is especially vital in Education.

Lexical Analysis

Lexical analysis of the gamification articles are based on the titles and abstracts of the sampled articles (n= 208) (Figure 6). Accordingly, the most frequently used words were identified and visualized through a word cloud. The findings reveal that gamification as a term (n= 688), is the central theme. When clustered, the terms such as learning (n= 259), students (n= 129), education (n= 83), educational (n= 64), student (n= 46), knowledge (n= 44), course (n= 43), and training (n= 39) indicates its potential in terms of *education, teaching and learning* perspectives.

The words in the second cluster; game (n= 191), games (n= 117), gamified (n= 100), engagement (n= 95), social (n= 92), elements (n= 89), motivation (n= 81), experience (n= 47), behavior (n= 46), mechanics (n= 40), effectiveness (n= 38), gaming (n= 37), and play (n= 34) reveal core concepts and their implications. That is to say, game and play elements and their effect on *engagement, motivation behavior changes.*

The final cluster is about the gamification and its application areas. Accordingly, words such as design (n= 131), online (n= 79), software (n= 72), development (n= 59), system (n= 58), process

Figure 6. Word cloud of titles and abstracts of the gamification articles

(n= 55), technology (n= 46), application (n= 45), applications (n= 42), systems (n= 41), context (n= 38), tool (n= 34) demonstrates gamification and its application areas. In this regard, it can be said that gamification is mostly related to *gamified designs,* such as software, apps, tools or systems, processes, or contexts.

These findings also confirm Caponetto, Earp and Ott (2014), who generated a word cloud in a sample of 119 articles. They reported that the terms: increase and improve; motivate / motivation and engage/ment; school and courses; social and design were important terms that emerged in their research.

Keyword Analysis

A total of 1015 keywords were collected from 208 articles on Gamification. For the articles that did not provide keywords (n=44), keywords were defined based on their titles. The 57 keywords with at least three frequencies are provided in Table 1. As expected, *gamification* is the most frequently used keyword. Some keywords, which indicate the purpose of the gamification, are salient. For instance, the path from the following keywords indicates the promise of gamification: engagement, motivation, behavioral change, marketing, customer engagement, intrinsic motivation, user experience, behavior, enjoyment, experience, incentives, and sustainability.

These findings confirm those of Martí-Parreño, Méndez-Ibáñez and Alonso-Arroyo (2016), who identified four main themes in gamification research: effectiveness (assessment, effectiveness,

Table 1. The most frequent keywords used in gamification articles

#	Keywords	F*	#	Keywords	F*	#	Keywords	F*
1	Gamification	161	*20*	Customer Engagement	5	*39*	Elementary School	3
2	Engagement	22	*21*	Game	5	*40*	Employee Engagement	3
3	Motivation	20	*22*	Game Dynamics	5	*41*	Gamification in Education	3
4	Game Mechanics	15	*23*	Games	5	*42*	Health	3
5	Game-Based Learning	14	*24*	Innovation	5	*43*	Human	3
6	Serious Games	12	*25*	Intrinsic Motivation	5	*44*	Interactive Learning Environments	3
7	Social Networking	11	*26*	User Experience	5	*45*	Learning Management System	3
8	Game Elements	10	*27*	Badges	4	*46*	Management	3
9	Education	8	*28*	Behaviour	4	*47*	Pedagogy	3
10	e-learning	8	*29*	Enjoyment	4	*48*	Pervasive Games	3
11	Behavioral Change	7	*30*	Ethics	4	*49*	Physical Activity	3
12	Learning	7	*31*	Experience	4	*50*	Play	3
13	Design	6	*32*	Flow	4	*51*	Qualitative Research	3
14	Game Design	6	*33*	Gamify	4	*52*	Self-Determination Theory	3
15	Gaming	6	*34*	Incentives	4	*53*	Social Media	3
16	Marketing	6	*35*	Training	4	*54*	Software Design	3
17	Persuasive Technology	6	*36*	Children	3	*55*	Survey	3
18	Simulation	6	*37*	Computer Games	3	*56*	Sustainability	3
19	Video Games	6	*38*	eHealth	3	*57*	Wellbeing	3

*F: Frequency

cognitive, attention, perceptions, improvement and satisfaction), acceptance (attitudes, usefulness, acceptance and adoption), engagement (engagement, flow and enjoyment) and social interactions (collaboration and interaction). As can be seen in Table 1, the keyword analysis matches with the themes and concepts proposed by Martí-Parreño et al. (2016).

Social Network Analysis

Social Network Analysis (SNA) is used to map and see keyword network of gamification papers. As can be seen in Figure 7, the significant keywords in central cluster are: Gamification, motivation and engagement. The patterns in SNA confirm findings explored in keyword analysis.

Gamification Related Fields

Articles sampled in this study were coded according to the fields with which they were related (Table 2). Our analysis showed that most of the gamification articles are related to education (45.19%). Articles that deal with gamification itself and core concepts related to gamification categorized as theory related articles (14.42%). There are also other related fields, such as health (11.06%), marketing (8.17%), design (7.21%), business (6.73%), engineering (1.92%), libraries (1.92%), tourism (1.44%), management (1.44%), and communication (0.48%).

Though not in the same ranks, these findings also confirm Seaborn and Fels (2015), who reported that gamification is a multidisciplinary field that is related to fields such as education, online communities and social networks, health and wellness, crowdsourcing, sustainability, orientation, computer science and engineering, marketing, and computer-supported cooperative work.

Theoretical/Conceptual Perspectives

Of all the sampled articles (n=208), 118 articles (56.73%) didn't benefit from any theoretical/ conceptual frameworks. A total of 90 articles (43.27%) benefited from a wide array of theoretical/

Figure 7. SNA for the keywords in gamification papers

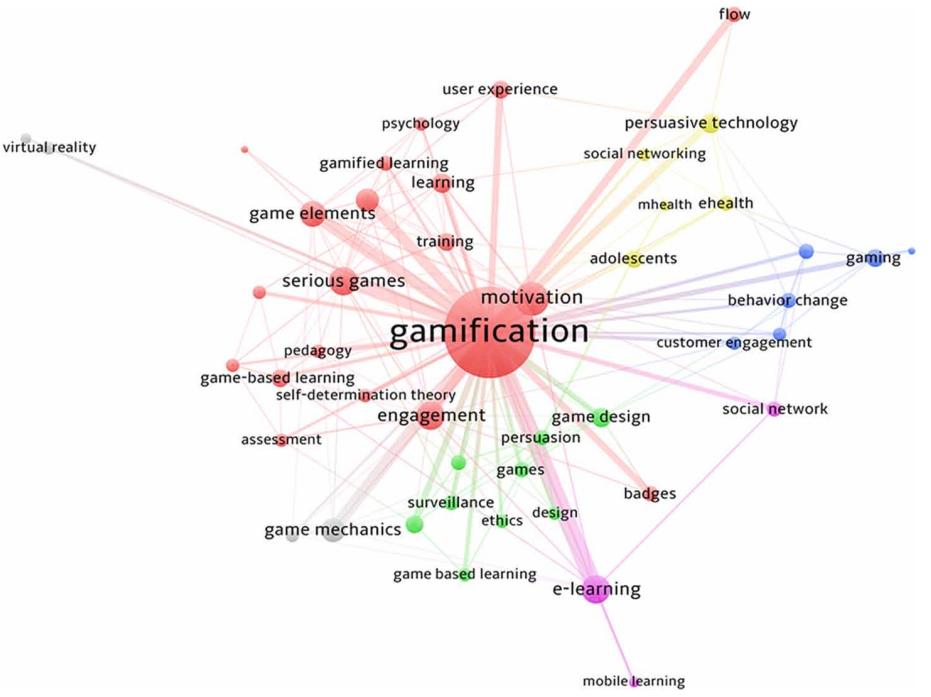


Table 2. Distribution of the fields that were covered in gamification articles

Field	Frequency	%
Education	94	45,19
Theory	30	14,42
Health	23	11,06
Marketing	17	8,17
Design	15	7,21
Business	14	6,73
Engineering	4	1,92
Libraries	4	1,92
Tourism	3	1,44
Management	3	1,44
Communication	1	0,48

conceptual frameworks. In these articles, 97 different theoretical/conceptual frameworks were used 165 times. Theoretical/conceptual frameworks that were counted at least two times were provided in Table 3. Among the articles that used theoretical/conceptual frameworks, Self-Determination Theory (Ryan & Deci, 2000), Flow Theory (Csikszentmihalyi, 1990), and MDA (Mechanics, Dynamics, and Aesthetic) Framework (LeBlanc, 2004) are the lenses offering the most benefit in gamification articles.

These lenses are summarized as follows. Self-Determination Theory is an approach to human motivation and personality that uses traditional empirical methods while employing an organismic metatheory, highlighting the importance of human's evolved inner resources for personality development and behavioral self-regulation (Ryan, Kuhl, & Deci, 1997). According to Flow Theory, being ''in flow'' is the way that some interviewees described the subjective experience of engaging just-manageable challenges by tackling a series of goals, continuously processing feedback about progress, and adjusting action based on this feedback. Under these conditions, experience seamlessly unfolds from moment to moment, and one enters a subjective state (Nakamura & Csikszentmihalyi, 2002). MDA is a formal approach to understanding games, which attempts to bridge the gap between game design and development, game criticism, and technical game research (Hunicke, LeBlanc, & Zubek, 2004). The MDA framework depicts the relationship of the designer and the player. The designer designs the mechanics or formal rules of the game. These rules are instantiated at playtime and influenced by the player's inputs, forming the dynamics, or run-time behavior of the game. The aesthetics of the game are the resulting emotional responses in the player when playing (Winn, 2008).

Findings of this research confirm Seaborn and Fels (2015) and Mora *et al.*, (2015), who also reported that Self-Determination Theory was the mostly used theoretical/conceptual framework in gamification research. Besides, similar to the findings in this research, Seaborn, and Fels (2015) reported that there is a gap between theory and practice, which is thought to limit the growth of the field as a whole.

Citation Analysis

This section provides the most cited references in the sampled gamification articles. A total of 7254 references, which were cited in 208 gamification articles published between 2011 and 2016, were collected and ranked according to their frequencies. The most cited ten studies are provided in Table 4. The most cited 73 references, ranked from 1 to 20 with a minimum frequency of six, are provided

Table 3. Distribution of the most frequently used theoretical/conceptual frameworks

Theoretical/Conceptual Frameworks	Frequency	%
Self-Determination Theory	23	8,10
Flow Theory	9	3,17
MDA (mechanics, dynamics and aesthetics) framework	7	2,46
Theory of Planned Behavior	5	1,76
The ARCS Model	5	1,76
Social Cognitive Theory	4	1,41
A User-Centered Theoretical Framework for Meaningful Gamification	4	1,41
Digital Game-Based Learning	4	1,41
Motivation Theory	3	1,06
Social Learning Theory	2	0,70
Self-Efficacy Theory	2	0,70
Diffusion of innovation theory	2	0,70
Cognitive Evaluation Theory	2	0,70
Game Design	2	0,70
Fogg's Behavioral Model	2	0,70
Technology Acceptance Model	2	0,70
Game Theory	2	0,70
Theory of Organizational Behavior,	2	0,70
Maslow's Hierarchy of Needs	2	0,70
Cognitive Load Theory	2	0,70
The Theory of Reasoned Action	2	0,70
Transtheoretical Model	2	0,70
N/A	119	41,90
Others	75	26,41

in Appendix A, in the belief that such a robust reference guide would be helpful to researchers who want to dig deeper into gamification research.

CONCLUSION AND IMPLICATIONS FOR FUTURE DIRECTIONS

This study explored trends and patterns in gamification research. For this purpose, the research used a systematic review approach and examined gamification papers published between 2011 and 2016. The distribution of sampled articles indicates that there is an increasing tendency in the number of the articles.

The most used methodologies are, respectively, conceptual/descriptive (46.63%), quantitative (32.21%), qualitative (13.46%), mixed (3.37%), data mining and analytics (2.88%), and practice-based (1.44%) approaches. Though conceptual/descriptive methodological approaches constitute the majority, there is an increase in other types of methodological approaches. Trends regarding the research model/designs revealed that literature reviews (32.7%), experimental studies (11.5%), correlational studies (10.6%), survey studies (9.6%) and case studies (8.7%) are the most preferred

Table 4. List of most cited references

Rank	F*	References
1	78	Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011, September). From game design elements to gamefulness: defining gamification. In *Proceedings of the 15th international academic MindTrek conference: Envisioning future media environments* (pp. 9-15). Tampere, Finland.
2	53	Zichermann, G., & Cunningham, C. (2011). *Gamification by design: Implementing game mechanics in web and mobile apps*. Sebastopol, CA: O'Reilly Media.
2	52	McGonigal, J. (2011). *Reality is broken: Why games make us better and how they can change the world*. New York: Penguin.
3	41	Hamari, J., Koivisto, J., & Sarsa, H. (2014, January). Does gamification work? A literature review of empirical studies on gamification. In *2014 47th Hawaii International Conference on System Sciences* (pp. 3025-3034). Waikoloa, HI, USA .
4	32	Kapp, K. M. (2012). *The gamification of learning and instruction: game-based methods and strategies for training and education*. San Fransisco: John Wiley & Sons.
5	30	Deterding, S., Sicart, M., Nacke, L., O'Hara, K., & Dixon, D. (2011, May). Gamification. using game-design elements in non-gaming contexts. In *CHI'11 Extended Abstracts on Human Factors in Computing Systems* (pp. 2425-2428). Vancouver, BC, Canada.
6	29	DomíNguez, A., Saenz-De-Navarrete, J., De-Marcos, L., FernáNdez-Sanz, L., PagéS, C., & MartíNez-HerráIz, J. J. (2013). Gamifying learning experiences: Practical implications and outcomes. *Computers & Education*, *63*(4), 380-392.
7	28	Lee, J. J., & Hammer, J. (2011). Gamification in education: What, how, why bother? *Academic exchange quarterly*, *15*(2), 146.
8	27	Simões, J., Redondo, R. D., & Vilas, A. F. (2013). A social gamification framework for a K-6 learning platform. *Computers in Human Behavior*, *29*(2), 345-353.
8	27	Werbach, K., & Hunter, D. (2012). *For the win: How game thinking can revolutionize your business.* Philadelphia: Wharton Digital Press.
9	22	Reeves, B., & Read, J. L. (2009). *Total engagement. Using Games and Virtual Worlds to change the way people work and businesses compete*. Boston, Massachusetts: Harvard Business Press.
9	22	Gee, J. P. (2007). *What video games have to teach us about learning and literacy.* New York: Palgrave Macmillan.
10	17	Bunchball, I. (2010). Gamification 101: An introduction to the use of game dynamics to influence behavior. *White paper*.
10	17	Prensky, M. (2001). *Digital game-based learning.* New York: McGraw-Hill.

*F: Frequency

research model/designs. Though the first article in a peer-reviewed journal was published in 2011, it was seen that gamification research had started to mature and produce empirical research, benefiting from different research paradigms, by 2013. This trend was interpreted as efforts to climb into the Slope of Enlightenment Cycle and then to reach to Plateau of Productivity Cycle in Gartner's Hype Cycles.

The lexical analysis identified three peripheral themes around the central theme of gamification. Accordingly, education, teaching and learning; engagement, motivation behavior change; and gamified designs are emerging patterns in gamification research. The keyword analysis revealed that the focal point of gamification research includes issues such as engagement, motivation, behavioral change, marketing, customer engagement, intrinsic motivation, user experience, behavior, enjoyment, experience, incentives, and sustainability.

The majority of gamification research was generally found to relate to the field of education. Other fields related to gamification research are respectively related to gamification theory, health, marketing, design, business, engineering, libraries, tourism, management, and communication

fields. Self-Determination Theory, Flow Theory, and MDA (Mechanics, Dynamics, and Aesthetic) Framework are the most beneficial lenses in gamification articles.

Based on the research findings and impressions gained from the reviewed articles, the study provides the following suggestions for future research directions. First of all, there is an imbalance among the research methodologies employed. In order to improve and develop the gamification field, the emerging phenomenon should be explored within different research paradigms. Conceptual/theoretical and quantitative research paradigms have been already used in gamification research. However, qualitative methodology to explore views of participants in gamified processes, mixed methodology to provide holistic perspectives, data mining and analytics to investigate interaction patterns or practice-based methodologies to design and develop gamified processes, would contribute to the gamification field. Secondly, it was seen that nearly half of the articles did not benefit from the theoretical/conceptual frameworks. Papers that benefited from theoretical/conceptual frameworks mostly depended on specific theoretical/conceptual frameworks, such as Self-Determination Theory. However, the researchers of this study believe that gamification articles should benefit from other existing frameworks to enrich their views and interpretations.

ACKNOWLEDGMENT

This study is supported by Anadolu University, Scientific Research Project Commission under the grand no: 1705E413.

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APPENDIX A

Table 5. List of the most cited references in the sampled studies with a minimum frequency of 10 (The top 10 listed in Table 4)

Rank	F	References
11	16	Barash, M., & Caillois, R. (2001). *Man, Play and Games.* Urbana: University of Illinois Press.
11	16	Huotari, K., & Hamari, J. (2012, October). Defining gamification: a service marketing perspective. In *Proceeding of the 16th International Academic MindTrek Conference,* Tampere, Finland (pp. 17-22).
11	16	Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary educational psychology*, *25*(1), 54-67.
11	16	Zichermann, G., & Linder, J. (2010). *Game-based marketing: inspire customer loyalty through rewards, challenges, and contests*. New Jersey: John Wiley & Sons.
12	15	Hamari, J. (2013). Transforming homo economicus into homo ludens: A field experiment on gamification in a utilitarian peer-to-peer trading service. *Electronic commerce research and applications*, *12*(4), 236-245.
12	15	Salen, K., & Zimmerman, E. (2004). *Rules of play: Game design fundamentals*. Cambridge, MA: MIT Press.
13	13	Huizinga, J., & Hull, R. F. C. (1949). *Homo Ludens. A Study of the Play-element in Culture (RFC Hull, Trans.)*. Routledge & Kegan Paul.
13	13	Buchanan, R., & Csikszentmihalyi, M. (1991). Flow: the psychology of optimal experience (book review). *Design Issues*, *8*(1), 80-81.
13	13	Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior.* New York and London: Plenum.
13	13	Deterding, S., Khaled, R., Nacke, L., Dixon, D. (2011) Gamification: Toward a Definition. In Proceedings of *CHI 2011 Gamification Workshop.* Vancouver, BC, Canada
14	12	Fogg, B. J. (2002). Persuasive technology: using computers to change what we think and do. *Ubiquity*, *2002*(December), 5.
14	12	Gartner, I. (2012). Gartner says by 2014, 80 percent of current gamified applications will fail to meet business objectives primarily due to poor design (Press Release).
14	12	Koivisto, J., & Hamari, J. (2014). Demographic differences in perceived benefits from gamification. *Computers in Human Behavior*, *35*, 179-188.
15	11	Deci, E. L., Koestner, R., & Ryan, R. M. (2001). Extrinsic rewards and intrinsic motivation in education: Reconsidered once again. *Review of educational research*, *71*(1), 1-27.
15	11	Hunicke, R., LeBlanc, M., & Zubek, R. (2004, July). MDA: A formal approach to game design and game research. In *Proceedings of the AAAI Workshop on Challenges in Game AI.* California, USA.
15	11	Nicholson, S. (2012). A user-centered theoretical framework for meaningful gamification. *Games+ Learning+ Society*, *8*(1), 223-230.
16	10	Glover, I. (2013). Play As You Learn: Gamification as a Technique for Motivating Learners. In *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications.* Chesapeake, VA, USA.
16	10	Nicholson, S. (2012). A user-centered theoretical framework for meaningful gamification. *Games+ Learning+ Society*, *8*(1), 223-230.
16	10	Yee, N. (2006). Motivations for play in online games. *CyberPsychology & Behavior*, *9*(6), 772-775.
16	10	Bartle, R. (1996). Hearts, clubs, diamonds, spades: Players who suit MUDs. *Journal of MUD research*, *1*(1), 19.

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