Gameful civic engagement

Government Information Quarterly 37 (2020) 101461

Contents lists available at ScienceDirect

Government Information Quarterly

journal homepage: www.elsevier.com/locate/govinf

Gameful civic engagement: A review of the literature on gamification of e-participation

Lobna Hassan[a,b,*], Juho Hamari[b]

[a] Gamification Group, Faculty of Humanities, University of Turku, Finland
[b] Gamification Group, Faculty of Information Technology and Communication, Tampere University, Korkeakoulunkatu 10, 33720 Tampere, Finland

ARTICLE INFO

Keywords:
Gamification
Games
E-participation
Governance
Civic engagement
Policy-making

ABSTRACT

With increased digitalization, governments and public institutes became potentially better able to practice fuller and wider ranges of democratic governance through e.g., e-participation. *E*-participation, as any means of engagement with the common good, is, however, a difficult area of human motivation as it can be seen to exist outside the common hurdles of the everyday life and where the effects of participation are often invisible or take a long time to materialize. Recent trends of digitalization, such as gamification; a popular approach for stimulating motivation, have been proposed as remedies to foster e-participation. A plethora of applications and research has emerged related to gamified e-participation. However, there is currently a dearth in our knowledge of how gamification is being applied, researched or what its possible positive and negative outcomes can be. This study employed a systematic literature review approach in order to summarize research and findings on gamified e-participation. 66 papers were reviewed, the majority of which indicated that gamified e-participation is linked to increased engagement, motivation, civic learning and enjoyment amongst other outcomes. Nonetheless, question remains as to ethical and inclusive gamification, for which, this research provides directions for future research.

1. Introduction

Digitalization has enabled several methods of coordinating human capital, such as through crowdsourcing (Morschheuser, Hamari, Koivisto, & Maedche, 2017), sharing economies (Hamari, Sjöklint, & Ukkonen, 2016), gig economies (Lehdonvirta, Kässi, Hjorth, Barnard, & Graham, 2019) and especially, to this study, e-participation (Bingham, Nabatchi, & O'Leary, 2005; Gurstein, 2003). While it has always been a debate whether citizen participation and involvement in governance or political processes is efficient (Arnstein, 1969; Conge, 1988; Macintosh, 2004) especially in today's world of overabundance of (mis)information (Dryzek et al., 2019), many governments and societal actors wish to promote citizen participation for the potentially positive impact it can have on, for example, legitimacy of decision-making (Eränpalo, 2014; Islam, 2008; Lee & Kim, 2014; Toots, 2019).

On the other hand, it has been observed that individuals' motivation to engage with these human capital coordination methods can be low. People often prefer to spend their time on activities of high personal relevance to them. (*E*-)participation, specific to this study, even when facilitated through relatively accessible digital rather than physical means (Phang & Kankanhalli, 2008; Sæbø, Rose, & Skiftenes Flak, 2008), often constitutes an activity that can be seen to exists outside the common hurdles of the everyday life and where the effects of engagement and time investments are often invisible or take a long time to materialize. (*E*)-participation is, hence, an area where it has often been a struggle to stimulate and maintain productive engagement (Alharbi, Kang, & Hawryszkiewycz, 2015; Bista, Nepal, Paris, & Colineau, 2014; Cernuzzi & Pane, 2014; Dryzek et al., 2019; Lee-Geiller & Lee, 2019).

Digitalization, nonetheless, has in parallel spawned technological developments that seek to motivate user, consumer, and citizen engagement, such as through *gamification.* Gamification refers to designing systems, services and processes to provide positive, engaging experiences similar to the engaging experiences games provide, commonly with the aim of motivating beneficial behaviors (Hamari, 2019; Landers, Auer, Collmus, & Armstrong, 2018). As playing games has increasingly become a widely visible form of leisure with demonstrated affordances for human engagement, flourishing and skills development (Table 1) (Fröding & Peterson, 2013; Granic, Lobel, & Engels, 2014), interest exponentially grew in introducing gamification to various aspects of life such as to education, work, health management and habits formation amongst several areas where gamification has been introduced (see Hamari, Koivisto, & Sarsa, 2014; Koivisto and Hamari,

* Corresponding author.
E-mail addresses: Lobna.hassan@tuni.fi (L. Hassan), Juho.hamari@tuni.fi (J. Hamari).

https://doi.org/10.1016/j.giq.2020.101461
Received 9 June 2019; Received in revised form 3 March 2020; Accepted 3 March 2020
Available online 07 April 2020

Table 1
Key benefits associated with or caused by playing games (Granic et al., 2014) that gamification attempts to harness.

Game benefits	Game genre	References
Cognitive benefits: Enhancement of mental processes, especially, those associated with reasoning, learning and understanding		
Improved speed and accuracy of attention allocation	Action, Shooter games	Bavelier, Achtman, Mani, & Föcker, 2012; Green & Bavelier, 2012
Improved visual, spatial reasoning, often in a short time and to high levels	Action, shooter games	Green & Bavelier, 2012; Uttal et al., 2013
Improved problem solving and decision-making skills	Puzzle, strategy, role-play games	Adachi & Willoughby, 2013; Duke, 1995; Prensky, 2012; Steinkuehler & Duncan, 2008
Creative thinking	All genres	Jackson et al., 2012
Enhanced abilities to learn new skills and transfer said skills to contexts outside games	Action, shooter games,	Duke, 1995; Fröding & Peterson, 2013; Green & Bavelier, 2012; McGonigal, 2011; Uttal et al., 2013
Motivational benefits: Enhancement of the drive to pursue meaningful goals, often through celebration of small triumphs and persistence against failure		
Motivation style reliant on persistence and continuous effort	All games	Ventura, Shute, & Zhao, 2013
Encourages incremental development through concrete, immediate feedback	All games	Granic et al., 2014; McGonigal, 2011
Motivational experiences of autonomy, competence and relatedness	All games	Ryan, Rigby, & Przybylski, 2006
Emotional benefits: Enhancement of mood regulation and emotional control capacities as well as providing a venue for experiencing a wide range of emotions		
Improved mood, relaxation, positive emotions and lower levels of anxiety and stress	All games (especially ones with simple interfaces and play)	Russoniello, O'Brien, & Parks, 2009; Ryan et al., 2006
Experiences of flow, transportation, and loss of self-consciousness	All games	Csikszentmihalyi, 2000; Fröding & Peterson, 2013; Sherry, 2004
Deters negative emotional habits such as renumeration and inflexibility	All games	Aldao, Nolen-Hoeksema, & Schweizer, 2010
Social benefits: Enhancing the acquisition of prosocial and interpersonal skills that often facilitate group and prosocial activities		
Improved acquisition of (new) prosocial skills and behaviors	Cooperative (action) games	Ewoldsen et al., 2012; Gentile et al., 2009
Increased civic engagement and contribution to civic activity organization	Cooperative (action) games	Lenhart et al., 2008; Eränpalo, 2014

2019; Morschheuser, Hamari, et al., 2017; Warmelink, Koivisto, Mayer, Vesa, & Hamari, 2018 for reviews). Gradually, consumers have come to expect that most of the systems they use are gamified in some form or another (Koivisto & Hamari, 2019; Sgueo, 2019). In the field of e-participation: gamification is similarly being actively introduced and appears to have the potential to increase citizen engagement with the common good and societal decision making (Asquer, 2014; Bista, Nepal, Colineau, & Paris, 2012; Eränpalo, 2014; Opromolla, 2015; Thiel, 2016c). Hence, a plethora of research and practical work has sprung up on gamified e-participation.

The essence of games and gamification is voluntary engagement (Gordon & Baldwin-Philippi, 2014; Landers et al., 2018). But with the introduction of gamification to especially governmental and democratic processes, there are concerns that the power imbalance between governments and citizens would create situations where engagement with gamification is not fully voluntary or autonomous, supporting, at best, "libertarian paternalism" (Thaler & Sunstein, 2003) - which aims to reinforce desirable societal outcomes in a top-down approach, while allowing people a degree of autonomy and free-choice - to "nudge politics" (Raihani, 2013) where such reinforcement is perhaps done through means and is for purposes that may be questionable. At worst, the power imbalance might mean that gamification can come to be employed intentionally, or accidentally, as means of "sugar-coating" coercive governmental practices (Ampatzidou et al., 2018; Asquer, 2014) that not only strengthen citizen perception of e-participation as a pretense practice (Losh, 2009) but perhaps more dyspeptically, coerce compliance with governmental policies that are undesirable or inherently in violation of some civil rights (Asquer, 2014). Gamification, on the other hand, can be and has been used as a means of governmental opposition (Wang & Zhang, 2017) which may aid in the formation of a healthy, progressive, democratic society but this raises concerns as to the extent to which gamification may, intentionally or accidentally, come to reinforce anarchy through the same strategies (Reilhac, 2013).

The aim of this work is to summarize and review the research that has been carried out on gamified e-participation so as to develop a knowledge base for understanding the contexts in which gamified e-participation is being researched, how, for whom it is most attractive, and what are its outcomes be. This study followed a literature review process focused on summarization of knowledge (Paré, Trudel, Jaana, & Kitsiou, 2015), reviewing 66 empirical and non-empirical research on gamified e-participation. Specifically, we conducted a representative, broad, descriptive review (Webster & Watson, 2002). This study allows a vantage point on the research that has been conducted on gamified e-participation, the outcomes it brings about as well as provides avenues for future research.

2. Background

2.1. E-participation

With the advancement of modern technology, participation of citizens in governance started to increasingly become electronically enabled since the early 1990s, in hopes of facilitating a wider reach and a better inclusion of marginalized groups in governance and democratic practices (Lee-Geiller & Lee, 2019; Macintosh, 2004; Supendi & Prihatmanto, 2015). Despite (e)participation becoming a relatively mature field of research, it remains problematic to define participation or its goals (Arnstein, 1969; Conge, 1988). E-participation can holistically be considered as technologically mediated interaction between the government and civil society (Sæbø et al., 2008). Focusing on its positive impact, (e)participation has been defined in terms of citizen engagement with each other and with the government towards the betterment of their community (Islam, 2008). The betterment of a community is, however, difficult to define or measure. More broadly. (e)participation is defined as local or national action, by an individual or a collective that positively or negatively impacts decision making regarding public goods, authority and urban structures (Conge, 1988). Perhaps a concise adaptation of this definition frames, e-participation as citizen involvement in political and governance processes (Bingham et al., 2005), connecting to Sherry Arnstein's (1969) seminal understanding of citizen participation as a redistribution of power by enabling the participation of the marginalized in political and governance processes. Of these processes, perhaps most notably, e-participation has

been conceptualized as citizens' participation in the policymaking process (Macintosh, 2004).

Policymaking is an integral aspect of governance that encompasses several stages, according to Ann Macintosh (2004): 1) agenda setting, in which the objectives of policies are determined, 2) analysis, where the objectives of and needs for policies are analyzed, 3) creation, which involves the drafting and passing of policies, 4) implementation, which is about the enactment of passed policies, and 5) monitoring, which is about the continuous observation of society so as to trigger future cycles of policymaking. Three levels of citizen engagement with these stages of policymaking could be possible (Macintosh, 2004); 1) enabling; a basic level, focused on provision of information to citizens, 2) engaging; an intermediate level of relatively limited two-way citizen-government interaction, and 3) empowering; where citizens actively co-create with the governments, bottom-up, as equal partners. These levels of e-participation reflect the ladder of participation suggested seminally by Sherry Arnstein (1969), except for the "non-participatory" lower rungs of the ladder and without an explicit examination of what could be pretense participation that is merely implemented for appearances (Losh, 2009).

While a large number of people spend a significant portion of their time online (Hutchinson, 2015), the bulk of this online time is hardly directed towards e-participation activities or it's platform (Eränpalo, 2014;Lee & Kim, 2014; Toots, 2019). *E*-participation initiatives often struggle to garner an audience despite what had been expected when participation initiatives moved online. This lack of engagement can be attributed to many reasons such as a failure in socio-technologically managing these initiatives, lack of interest from citizens to participation, or the disengaging and uninviting design of many e-participation platforms (Lee & Kim, 2014; Toots, 2019). Such observations have called for increased research and study of alternative e-participation technologies that may drive user engagement, such as through gamification (Hassan, 2017, 2018; Thiel, 2015; Thiel, 2016a, 2016b, 2016c).

2.2. Gamified e-participation

(Digital) games are complex socio-technological artifacts that are hard to define (Stenros, 2017). They often represent artifacts created for entertainment purposes, where users are faced with artificial challenges, rules for solving those challenges and outcomes from engaging with the challenges (Salen, Tekinbaş, & Zimmerman, 2004). Playing games has been associated with several cognitive, emotional, motivational and social benefits (Granic et al., 2014), as summarized in Table 1. Hence, games, in a form or another, have been utilized in policymaking and related activities for decades so as to harness these benefits of games in non-game contexts (Duke, 1995, 2000, 2011; Mayer, 2009). The policy gaming field, for one field bridging games and governance, looks into, how simulation games can assist in policy planning and better organizational decision-making (Geurts, Duke, & Vermeulen, 2007). The rationale is that games make engagement with said process fun for citizens as well as expand the horizons of policy makers through allowing them to think about different possibilities in the relatively safe and inconsequential space of play. One such application is the early simulation game: METROPOLIS, where the purpose was to both involve officials in city planning and educate other users of the game about city planning (Duke, 1995, 2000). A review of game-based approaches in urban planning indicates that this space of play is especially effective with civic learning (Klamert & Münster, 2017).

Most game-based approaches in policymaking, whether in governmental, e-participation settings (Duke, 1995, 2011; Mayer, 2009) or in larger organizational settings (Geurts et al., 2007; Vesa, Hamari, Harviainen, & Warmelink, 2017) often relay on applications used top-down, to facilitate the making of a certain decision in session-like, timed set-ups. With gamification, this dynamic, arguably, has a higher potential to shift (Hassan & Thibault, 2020; Klamert & Münster, 2017). Gamification, as an emerging game-based approach in democratic/governmental processes, refers to designing systems, services and processes to provide positive, engaging experiences similar to the experiences good games provide (Hamari, 2019; Landers et al., 2018) - such as intrinsic motivation, playfulness, achievement and sense of community - commonly with the aim of motivating beneficial behaviors (Deterding, 2012, 2015; Huotari & Hamari, 2017). The conceptual difference between gamification and games perhaps stems from that gamification often aims to make (e-participation) activities themselves more game-like, rather than introduce a game artefact as an addition to a standardized e-participation process, although the later can still be observed in gamification practices (Hassan, 2017). Gamification in democratic/governmental processes often requires the redesign or amendment of such processes (Sgueo, 2017, 2019) which might not be seen if a game was being introduced as a mere addition to the processes in question. Many gamification implementations, additionally, often aim to facilitate longitudinal collaborations where the objective is not just to aid in timed decision-making but also to aid with the active analysis, implementation and monitoring of decisions and the maintenance of a crowd base for future engagement needs (Klamert & Münster, 2017; Sgueo, 2019). Gamification can also be implemented by citizens themselves as well as by governments (Hassan & Thibault, 2020; Klamert & Münster, 2017) possibly because gamification can commonly be implemented through relatively less resources than full games require, allowing citizens to actively initiate and maintain gamified, engaging civic communication and activity themselves.

Gamification can, nonetheless, vary hugely in how it is implemented. It can be implemented through heavily relying on the introduction of design features unique to games (known as game elements) to existing systems or service (Bogost, 2014; Deterding, Dixon, Khaled, & Nacke, 2011). For example; the application CityCare utilizes a point system, on top of a problem reporting system, to encourage citizens to actively communicate any problems they encounter in their city to administrators (Bousios, Gavalas, & Lambrinos, 2017). In such an implementation, little change to governmental or political processes is observed. Gamification implementations can also extend beyond the digital, employing physical props/hardware such as game controllers, such as in, for example, an application intend to assist law enforcement officers in the regulation of drones (Lindley & Coulton, 2015). Gamification can also be implemented through stories and role-play that immerse players in imagined realities, such as one where the players are mapping a city to facilitate the development of accessible mobility maps while fighting off zombies (Prandi et al., 2017). Additionally, gamification in policy making, is not always intentional, as is seen with the utilization of memes during elections (Haleva-Amir, 2016). Finally, gamification is not necessarily an effort to support existing processes but is also, sometimes, an effort to express opposition of it (Wang & Zhang, 2017). Due to these differences in its implementations, outcomes from gamification can vary and hugely depend on the implemented design and the use context. Koivisto and Hamari (2019), nonetheless, conducted a systematic literature study of research on gamification in various contexts, offering a holistic overview of gamifications' positive and negative outcomes. Table 2 provides a summary of key outcomes from gamification.

Gamification, in the context of e-participation – defined in this study as digitally enabled engagement with policymaking - is believed to have the potential to positively impact engagement with democratic governance facilitated through e-participation initiatives (Coronado Escobar & Vasquez Urriago, 2014; Gordon & Baldwin-Philippi, 2014; Raphael, Bachen, Lynn, Baldwin-Philippi, & McKee, 2010). However, while gamification has been introduced to many contexts (see Hamari et al., 2014; Koivisto & Hamari, 2017; Morschheuser, Hamari, et al., 2017; Warmelink et al., 2018 for reviews), gamification practices and their outcomes do not seamlessly transfer across contexts (Asquer, 2014; Thiel, 2016c). Hence, there is a need to develop a knowledge base of gamified e-participation and its outcomes through an examination of the contextualized research on gamification in e-

Table 2
Key positive and negative outcomes associated with or caused by gamification (Koivisto & Hamari, 2019).

Outcomes		Description	Reference/sample research
Cognitive	Positive	Perceived usefulness of gamification	Hassan, Hamari, & Dias, 2019; Rodrigues, Costa, & Oliveira, 2013
		Learning/perception of learning	Pedro, Lopes, Prates, Vassileva, & Isotani, 2015; Shernoff, Hamari, & Rowe, 2014
		Understanding of users of the service	Harwood & Garry, 2015;
	Negative	Perceived cognitive load or distractions from the task at hand	Andrade, Mizoguchi, & Isotani, 2016; Hanus & Fox, 2015; Harwood & Garry, 2015
Motivational	Positive	Motivation, engagement	Andrade et al., 2016; Hamari, 2017; Xi & Hamari, 2019; Hamari & Koivisto, 2015; Harwood & Garry, 2015; Morschheuser, Hamari, & Maedche, 2019
	Negative	Lack of significant change to motivation	Pedro et al., 2015;
		Demotivation, avoidance	Hamari, Hassan, & Dias, 2018; Hanus & Fox, 2015
Emotional	Positive	Enjoyment, fun	Morschheuser, Maedche, & Walter, 2017, Morschheuser et al., 2019; Rigby, 2015; Rodrigues et al., 2013
		Flow, immersion	Andrade et al., 2016; Hassan et al., 2019; Hassan, Rantalainen, Xi, Pirkkalainen, & Hamari, 2020; Shernoff et al., 2014
		Satisfaction, playfulness, entertainment and other positive emotions	Hassan et al., 2019; Hassan, Rantalainen, et al., 2020; Harwood & Garry, 2015; Xi & Hamari, 2019
	Negative	Anxiety, annoyance	Andrade et al., 2016; Harwood & Garry, 2015; Hanus & Fox, 2015
		Skepticism	Hassan, Morschheuser, Alexan, & Hamari, 2018
Social	Positive	Perception of sociability and relatedness	Hassan et al., 2019; Hassan, Rantalainen, et al., 2020; Hamari & Koivisto, 2015; Xi & Hamari, 2019
		Recognition and social influence	Hamari & Koivisto, 2015; Harwood & Garry, 2015;
	Negative	Hyper competitiveness, negative social behavior	Andrade et al., 2016; Bogost, 2014; Harwood & Garry, 2015; Toda, Valle, & Isotani, 2017
		Social anxiety or pressure	Toda et al., 2017
Behavioral	Positive	Behavioral change in different contexts	Hamari & Koivisto, 2015; Morschheuser, Hamari, et al., 2017; Warmelink et al., 2018;
		Participation	Hamari, 2017; Harwood & Garry, 2015; Morschheuser, Maedche, & Walter, 2017, Morschheuser et al., 2019; Rodrigues et al., 2013
		Enhanced participation quality	Cechanowicz, Gutwin, Brownell, & Goodfellow, 2013
		Use intentions or acceptance of gamification	Hassan et al., 2019; Hassan, Xi, Gurkan, Koivisto, & Hamari, 2020; Hamari & Koivisto, 2015; Rodrigues et al., 2013
	Negative	Cheating, gaming the system	Pedro et al., 2015;
		Activity related mistakes or low-quality participation	Hanus & Fox, 2015; Toda et al., 2017

participation. Gamification and e-participation are an especially intriguing gamification application context to study as several polarizing facets emerge in their juxtaposition. Policymaking, and governance in general, are commonly connected to serious, persistent and systematic practices, while playing games, and perhaps gamification by extension, have traditionally been regarded a foolhardy activity without instrumental outcomes. Gamified e-participation is also often debated in practice, in terms of whether it can be a means to support potentially coercive forms of governmental paternalism (Ampatzidou et al., 2018; Asquer, 2014) that not only strengthen citizen perception of e-participation as a pretense practice (Losh, 2009) but also endorses compliance with governmental policies that are undesirable or inherently in violation of civil rights in a society (Asquer, 2014). It is hence important to understand how this emerging approach to fostering e-participation has been implemented as well as its outcomes.

3. Methodology

Literature review approaches can be divided into four distinct approaches depending on their goal: 1) summarization of knowledge, 2) data aggregation (of empirical studies), 3) explanation building or 4) critical assessment of extant literature (Paré et al., 2015). Whereas the first type of reviews (including narrative, descriptive or scoping reviews) attempts to broadly map and describe a body of literature, data aggregation approaches attempt to aggregate results in a field and specially between specific sets of variables. The explanation building approach attempts to build theory without a descriptive study of the field it reports on and the critical assessment approach attempts to primarily poke holes in existent literature. Given the goal of this review, we adopt a summarization of knowledge approach. More specifically, we aimed to conduct a representative, broad and descriptive review employing a systematic literature search and coding.

We follow a concept centric coding strategy according to Webster and Watson (2002) in order to organize the existent literature per publication and per concepts to describe the body of literature quantitatively. Therefore, the process employed by this study proceeded as follows: 1) explorative literature search to map relevant keywords, 2) systematic literature search (of Scopus database), 3) inclusion and exclusion procedures, 4) backward search, 5) forward search, 6) concept-centric coding and analysis of literature, 7) findings reporting (in this study).

As Ann Macintosh's framework to characterizing e-participation (Macintosh, 2004) is one of the esteemed frameworks to defining and examining e-participation, we adopted it in examining and coding the concepts emergent in the literature review. Hence, the aspects collected from the literature included:

- Full manuscript reference
- *E*-participation application context
- Study type: empirical/non-empirical
- Research methods employed
- E-participation level focus of manuscript: enabling/engaging/empowering
- Policymaking stage focus of manuscript: all (undefined by the authors of the reviewed manuscript)//agenda setting/analysis/creation/implementation/monitoring
- Type of gamification employed if a gamified tool is reported on
- Gamification evaluation approach: qualitative/quantitative/mixed
- Results from employing gamification: positive/negative/neutral/mix/not reported
- Psychological and behavioral outcomes from employing gamification
- Governmental involvement in the research: yes/no

The literature search was carried out in May 2018. The database of Scopus was queried using the query:

TITLE-ABS-KEY (gamif*) AND TITLE-ABS-KEY (gov*) OR TITLE-ABS-KEY (poli*) OR TITLE-ABS-KEY (urban) OR TITLE-ABS-KEY (eparticip*) OR TITLE-ABS-KEY (e-particip*) AND (LIMIT-TO (DOCTYPE, “cp”) OR LIMIT-TO (DOCTYPE, “ar”) OR LIMIT-TO (DOCTYPE, “ch”) OR LIMIT-TO (DOCTYPE, “ip”).

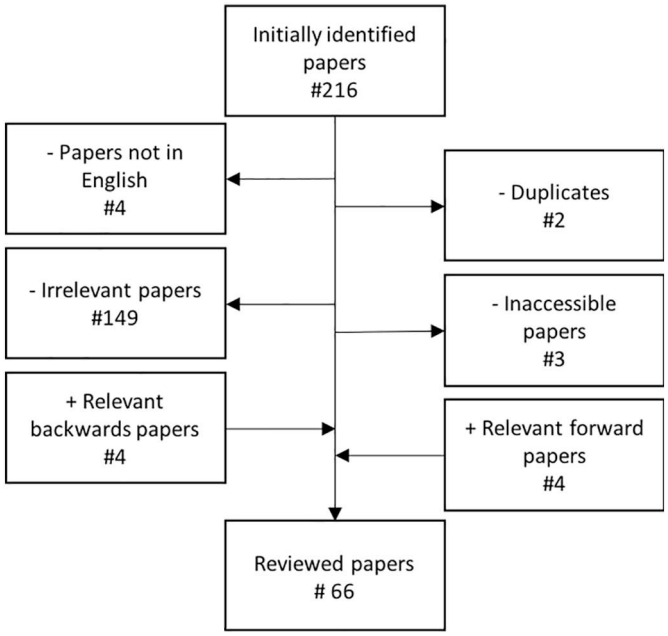

Fig. 1. Literature search process and outcomes.

The keyword gamif* includes all forms of the word gamification. Keywords gov*, poli*, urban, eparticip*, e-particip* were used to include literature related to e-participation. We limited the search to journal articles, conference papers, book chapters thus automatically excluding for example conference track introductions. Before deciding on the keywords, exploratory searches of the literature were made to ensure that the keywords covered the relevant literature, in line with the recommendations of Webster and Watson (2002). Fig. 1 depicts the literature search process.

The literature search started with the identification of 216 manuscripts, from which 4 were excluded as they were not in English. 2 duplicates were next removed, 3 manuscripts (Opromolla, Volpi, & Medaglia, 2016: Paris & Nepal, 2015; Virkar, 2017) were excluded as they were inaccessible through the libraries of the authors of this work or through contacting the authors of the papers in question through ResearchGate. Next, papers on topics other than gamified e-participation in policymaking were excluded (e.g., papers pertaining to learning, habits formation, health etc.), leaving 58 manuscripts. Following the backwards references of these manuscripts revealed 4 relevant manuscripts. Forward references revealed 4 more. In total 66 manuscripts were included in this literature study. Categorization and coding of the manuscripts included in this literature review study, as presented in Tables 3-6 was done according to what is reported in the reviewed manuscripts as defined by the authors of those manuscripts.

4. Findings, discussion & future directions

The findings of the conducted literature review pertain to 4 main veins of discussion according to which this findings and discussion section is structured. Section 4.1 summarizes the research methodologies employed in the reviewed research corpus so as to reflect on the methods employed in the field of gamified participation and its strengths and limitations. Section 4.2 discusses the tracked variables of interest pertaining to e-participation according to the framework by Ann Macintosh (2004) as defined in Section 2.1. Section 4.2, in detail, reflects on e-participation engagement levels, and the policymaking stages and contexts where e-participation has been introduced. Section 4.3 presents the types of gamification identified in the reviewed corpus. Section 4.4 presents a summary of the evaluation approaches employed to evaluate gamification implementations and the reported positive and negative outcomes from gamified e-participation. Section 5, finally, presents the limitations of the conducted literature study and directions for future researchers wishing to expand on our work.

4.1. Methodological approaches

Table 3 summarizes the research methodologies employed in the reviewed literature corpus. Most of the reviewed corpus reported on research that employed more than one research method, hence a manuscript can appear more than once in Table 3. The observed utilization of mixed methods in the reviewed literature highlights an attempt towards obtaining findings from various vantage points that can possibly complement each other and accelerate the development of the gamified e-participation field. 41 of the identified manuscripts reported on empirical research while 25 reported on non-empirical research. Accordingly, future researchers are encouraged to contribute theoretical knowledge on gamified e-participation as well as perhaps introduce and contextualize connected theory from other branches of research - such as from psychology and sociology - to build the relatively lacking theoretical base of gamified e-participation.

The majority of the reviewed research utilized design, prototyping and implementation methods, most notably in combination with quantitative methods such as log data analyses and surveys. Most of this research reported on experimental implementations that represent proves of concepts used for short periods to prove the validity of an idea. The reviewed research rarely reported on real gamified e-participation tools that are used on-ground, although such tools are discussed in media and grey literature. Future researchers are encouraged to implement longitudinal research, in real-life settings, and to additionally research established tools that are reported on in practice so that we can develop better knowledge of gamified e-participation in practice and on the long run.

Most of the reviewed research on gamified e-participation has employed quantitative methods such as surveys and log data analyses, which have reportedly been valuable in reflecting user experiences and preferences (Toots, 2019). Qualitative studies through, for example, focus groups, user interviews and observations are also present in the gamified e-participation research field, however, they are relatively scarcely observed. More qualitative research is perhaps needed as it can reveal nuanced differences in the reception of and outcomes from gamified e-participation that may not be reflected through quantitative approaches.

Similarly, the inclusion of important stakeholders in e-participation, beyond citizens and civil servants, such as politicians or NGOs (Sæbø et al., 2008), was rarely observed in the reviewed corpus and corpus mainly reported on, in brief, by two studies (Ampatzidou et al., 2018; Rehm, 2015). The voices of these stakeholders remain relatively unaccounted for, which is of danger as there already are indicators to the existence of a divide in the perception of gamified e-participation across researchers, citizens, government officials and politicians (Ampatzidou et al., 2018; Haleva-Amir, 2016; Hassan, 2017; Wang & Zhang, 2017). Future researchers are encouraged to investigate gamified e-participation with more stakeholders beyond citizen and civil servants so as to account for all voices in the gamified e-participation process.

4.2. E-participation dimensions

Table 4 summarizes the tracked variables of interest pertaining to e-participation according to the framework by Ann Macintosh (2004) as defined in Section 2.1. Papers were coded in the table according to whether they discussed an aim to enable/engage/empower e-participation. The same was done with regards to the decision-making stage to which the work being reviewed pertained as inferred from the manuscript being reviewed. Otherwise, the manuscript would be categorized in a “generic” category. Some of the research addressed more than one stage of decision making or level of e-participation, hence, some papers

Table 3
Summary of the research methods employed by the reviewed manuscripts.

Methods	Studies	#
Design & Prototyping	Bianchini et al., 2016a; Bianchini et al., 2016a; Bista et al. 2012, 2014; Bousios et al. 2017; Devisch et al., 2016; Fernandes & Junior 2016; Giangreco et al., 2014; Hu & Chen 2015; Kazhamiakin et al., 2015; Kazhamiakin, Marconi, Martinelli, Pistore & Valetto 2016; Lindley & Coulton 2015; Münster et al., 2017; Nepal et al., 2015; Olszewski et al., 2016; Opromolla 2015; Paris et al., 2018; Poslad et al., 2015; Prandi et al. 2017; Rakhmawati, & Fibrianto 2016; Rehm 2015; Romano et al., 2016; Romano et al., 2018; Semanjski et al., 2016; Supendi & Prihatmanto 2015; Supriadi & Prihatmanto 2015; Thiel & Fröhlich 2017; Thiel & Lehner 2015; Wei & Anwar 2017	29
Log data analysis	Bianchini et al. 2016a, 2016b; Bista et al. 2012, 2014; Bousios et al. 2017; Fernandes & Junior 2016; Giangreco et al. 2014; Kazhamiakin et al. 2016, 2015; Nepal et al. 2015; Olszewski et al. 2016; Poslad et al. 2015; Paris et al. 2018; Prandi et al. 2017; Rehm 2015; dos Santos et al., 2015; Semanjski et al. 2016; Supriadi & Prihatmanto 2015; Thiel 2016b; Thiel & Lehner 2015; Wei & Anwar 2017	21
Surveys (qualitative & quantitative	Ampatzidou et al. 2018; Bianchini et al. 2016a, 2016b; Bousios et al. 2017; Devisch et al. 2016; Kazhamiakin et al. 2016; Opromolla 2015; Paris et al. 2018; Poslad et al. 2015; Prandi et al. 2017; Rakhmawati, & Fibrianto 2016; Rehm 2015; Romano et al. 2018; Susanto et al., 2017; Thiel 2016a, 2016b; Thiel & Fröhlich 2017; Thiel & Lehner 2015; Thiel et al., 2016	19
Field studies & experiments	Bianchini et al. 2016a, 2016b; Bousios et al. 2017; Devisch et al. 2016; Fernandes & Junior 2016; Kazhamiakin et al. 2015; 2016; Lindley & Coulton 2015; Olszewski et al. 2016; Poslad et al. 2015; Prandi et al. 2017; Rehm 2015; Romano et al. 2018; Thiel 2016a, 2016b; Thiel & Fröhlich 2017; Thiel & Lehner 2015; Thiel et al. 2016; Wei & Anwar 2017	19
Theoretical analysis	Al-Yafi & El-Masri 2016; Asquer 2014; Blazhko et al., 2017; Coronado Escobar & Vasquez Urriago 2014; Crowley et al. 2012; Foxman & Forelle 2014; Giangreco et al. 2014; Gnat et al., 2016; Hassan 2017; Klamert & Münster 2017; Mahnič 2014; Oceja & Fernández 2017; Rui et al., 2015: Thiel 2015; Vanolo 2018; Wang & Zhang 2017; Weerawarna et al. 2017; Williamson 2017	18
User focus groups & interviews,	Bousios et al. 2017; Brunet et al. 2018; Devisch et al. 2016; Guzman & Clapp 2017; Hu & Chen 2015; Lindley & Coulton 2015; Münster et al. 2017; Paris et al. 2018; Prandi et al. 2017; Rehm 2015; Romano et al. 2016, 2018; Sandoval-Almazan & Valle-Cruz 2017; Thiel 2016b; Thiel & Lehner 2015	15
Design (no implementation)	Apostolopoulos et al., 2018; Brunet et al., 2018; Carreira et al., 2017; Crowley et al., 2012; de Dios Bulos et al., 2014; Guzman & Clapp 2017; Martí et al. 2012; Mulyana et al., 2015; Pang et al., 2017; Vogiatzi et al., 2017; Weerawarna et al. 2017	11
Case studies	Ampatzidou et al. 2018; Münster et al. 2017; Sandoval-Almazan & Valle-Cruz 2017; dos Santos et al. 2015; Thiel 2016a	5
Qualitative observation	Bousios et al. 2017; dos Santos et al. 2015; Thiel & Fröhlich 2017; Thiel & Lehner 2015	4
Literature reviews	Münster et al. 2017; Opromolla 2015; Opromolla et al., 2015; Thiel 2016c	4
Ethnography	Foxman & Forelle 2014; Haleva-Amir 2016; Tolmie et al., 2014	3
Expert interviews	Ampatzidou et al. 2018; Rehm 2015	2

are coded more than once in Table 4. The context of the studies was inferred according to the area to which the reviewed research aimed to contribute. With regards to stages if policymaking that the reviewed corpus aimed to facilitate, 29 of the reviewed manuscripts generically examined gamified e-participation in policymaking with no further specification. Focused research on certain stages of policymaking is present, however comparatively less popular. Focused research is encouraged as it could help ensure the smooth implementation of gamification attuned to the requirements of specific policymaking stages. No research explicitly focused on the "creation" stage of policymaking. This is possibly because policy creation remains a duty exclusive of governmental agencies (Macintosh, 2004). Accordingly, researchers might not have been motivated to research gamified engagement with policy creation as there may not be many benefits in creating citizen engagement with the creation stage of policymaking in the first place. Researchers are encouraged to investigate the potential needs for, if any, requirements of and outcomes from the introduction of gamification to the creation stage of policymaking.

Reviews of game-based approaches in the context of urban planning indicate the popularity of these approaches in facilitating citizen involvement in the early stages of policymaking (Klamert & Münster, 2017), Unsurprisingly, and as can be seen in Appendix A, the majority of the research we reviewed on gamification in urban planning, in specific, is indeed mainly concerned with the involvement of citizens in the agenda setting or analysis stages of policymaking. Nonetheless, and in contrast, it appears from our review at large, as well as from a previous review on gamification in smart cities (Opromolla, 2015) that gamification in specific is most popular at the implementation stage of policymaking. These observations can indicate that when it comes to the specific context of urban planning, perhaps citizen involvement is mainly encouraged/investigated at the early stages of policymaking, although citizen involvement is thought to be desirable at later stages of the process as well (Münster et al., 2017). Perhaps this is because the implementation stage and later stages of urban planning mainly require governmental effort, in a top-down manner, to implement urban plans, with relatively little need for citizen input.

Nonetheless, the observed differences between the popularity of game -based approaches at the early stages of urban planning compared to the popularity of gamification at the later stages of policymaking at large, reinforces the previous discussion in Section 2.2, highlighting that gamification is perhaps a different game-based approach to civic engagement that is suitable for purposes different from what we have seen with previous game-based approaches. Gamification is an approach most notably popular with behavioral change or to motivate activity (Deterding, 2012; Harviainen & Hassan, 2019; Koivisto & Hamari, 2019). It is hence, especially suited to facilitate implementation of policies where a change in citizen behavior is needed or where active engagement is desirable to facilitate the smooth implementation of a policy.

In this stream of research on the implementation stage of policymaking (26 manuscripts), we observe a significant focus on the creation of "good citizens" (Al-Yafi & El- Masri 2016; de Dios Bulos et al., 2014; Kazhamiakin et al., 2016; Williamson, 2017). Largely, the reinforcement of "good" citizen habits that have been deemed good for society is a main focus of most gamification in governmental contexts (Opromolla, 2015; Opromolla et al. 2017). While this direction of research could be of societal benefit, as, for example; encouraging the use of sustainable transport and recycling can be of benefit to a society, it raises concerns as to the ethics of gamification in general, and in e-participation and governmental contexts in specific (Hassan, 2017; Mahnič 2016). While gamification generally is often utilized to foster "good" habits (Koivisto & Hamari, 2019), it is of danger to utilize it to foster habits in a top-down manner by a (patriarchal) authority in a society, rather than through autonomous, voluntary user engagement. Researchers are encouraged to investigate the practice of creating "good citizens", and gamification ethics and morality in general and in contexts of power imbalance in specific.

In the stream of research on the implementation stage of policymaking, it is interesting to also observe that this is where many of the mixed and negative results from gamified e-participation come (Foxman & Foreille 2014; Tolmie et al., 2014; Poslad et al., 2015; Haleva 2016). This could be merely due to the relatively larger volume of

Table 4
Summary of e-participation specific aspects of the reviewed manuscripts as per Ann Macintosh's (2004) framework.

Level	Studies	#
All	Ampatzidou et al. 2018; Asquer 2014; Carreira et al. 2017; Coronado Escobar & Vasquez Urriago 2014; Guzman & Clapp 2017; Hassan 2017; Klamert & Münster 2017; Mahnič 2014; Oceja & Fernández 2017; Rehm 2015; Thiel 2016c; Vanolo 2018	12
Enabling	Blazhko et al. 2017; Fernandes & Junior 2016; Kazhamiakin et al. 2016, 2015; Nepal et al. 2015; Poslad et al. 2015; Semanjski et al. 2016; Williamson 2017	8
Engaging	Al-Yafi & El-Masri 2016; Apostolopoulos et al. 2018; Bista et al. 2012, 2014; Bousios et al. 2017; Brunet et al. 2018; Carreira et al. 2017; Crowley et al. 2012; Devisch et al. 2016; de Dios Bulos et al. 2014; Foxman & Forelle 2014; Gnat et al. 2016; Haleva-Amir 2016; Hu & Chen 2015; Lindley & Coulton 2015; Martí et al., 2012; Mulyana et al. 2015; Münster et al. 2017; Olszewski et al. 2016; Opromolla et al. 2015; Pang et al. 2017; Paris et al. 2018; Prandi et al. 2017; Rakhmawati, & Fibrianto 2016; Romano et al. 2016, 2018; Rui et al. 2015; Supendi & Prihatmanto 2015; Supriadi & Prihatmanto 2015; Susanto et al. 2017; dos Santos et al. 2015; Thiel 2015, 2016a, 2016b; Thiel & Fröhlich 2017; Thiel & Lehner 2015; Thiel et al. 2016; Tolmie et al. 2014; Vogiatzi et al. 2017; Weerawarna et al. 2017; Wei & Anwar 2017	41
Empowering	Bianchini et al. 2016a, 2016b; Münster et al. 2017; Opromolla 2015; Sandoval-Almazan & Valle-Cruz 2017; Thiel 2016a, 2016b; Thiel & Fröhlich 2017; Thiel et al. 2016; Vogiatzi et al. 2017	10

Policy stage	Studies	#
All	Ampatzidou et al. 2018; Asquer 2014; Blazhko et al. 2017; Brunet et al. 2018; Carreira et al. 2017; Coronado Escobar & Vasquez Urriago 2014; Devisch et al. 2016; Fernandes & Junior 2016; Giangreco et al. 2014; Gnat et al. 2016; Guzman & Clapp 2017; Hassan 2017; Hu & Chen 2015; Klamert & Münster 2017; Mahnič 2014; Münster et al. 2017; Oceja & Fernández 2017; Rehm 2015; Sandoval-Almazan & Valle-Cruz 2017; Susanto et al. 2017; Thiel 2015, 2016a, 2016b, 2016c; Thiel & Lehner 2015; Thiel et al. 2016; Vanolo 2018; Vogiatzi et al. 2017; Wang & Zhang 2017	29
Agenda setting	Bianchini et al. 2016a, 2016b; Olszewski et al. 2016; Opromolla et al. 2015; dos Santos et al. 2015; Thiel & Fröhlich 2017	6
Analysis	Bianchini et al. 2016a, 2016b; Olszewski et al. 2016; Opromolla et al. 2015; dos Santos et al. 2015	5
Creation	-	0
Implementation	Al-Yafi & El-Masri 2016; Apostolopoulos et al. 2018; Bista et al. 2012, 2014; de Dios Bulos et al. 2014; Foxman & Forelle 2014; Giangreco et al. 2014; Haleva-Amir 2016; Kazhamiakin et al. 2016, 2015; Lindley & Coulton 2015; Martí et al. 2012; Nepal et al. 2015; Olszewski et al. 2016; Pang et al. 2017; Paris et al. 2018; Poslad et al. 2015; Romano et al. 2016, 2018; Rui et al. 2015; Semanjski et al. 2016; Supriadi & Prihatmanto 2015; Tolmie et al. 2014; Wang & Zhang 2017; Weerawarna et al. 2017; Williamson 2017	26
Monitoring	Bianchini et al. 2016a, 2016b; Bousios et al. 2017; Crowley et al. 2012; Martí et al. 2012; Mulyana et al. 2015; Opromolla et al. 2015; Prandi et al. 2017; Rakhmawati, & Fibrianto 2016; dos Santos et al. 2015; Supendi & Prihatmanto 2015; Supriadi & Prihatmanto 2015; Thiel & Fröhlich 2017; Tolmie et al. 2014; Wei & Anwar 2017	15

Context	Studies	#
General / unspecified	Al-Yafi & El-Masri 2016; Asquer 2014; Bianchini et al. 2016a, 2016b; Coronado Escobar & Vasquez Urriago 2014; Hassan 2017; Hu & Chen 2015; Mahnič 2014; Opromolla et al. 2015; Rehm 2015; Romano et al. 2016; Thiel 2015, 2016b, 2016c; Thiel & Lehner 2015; Tolmie et al. 2014; Vanolo 2018; Vogiatzi et al. 2017; Weerawarna et al. 2017	19
Urban planning	Ampatzidou et al. 2018; Brunet et al. 2018; Devisch et al. 2016; de Dios Bulos et al. 2014; Gnat et al. 2016; Klamert & Münster 2017; Münster et al. 2017; Olszewski et al. 2016; Opromolla 2015; Thiel 2016a; Thiel & Fröhlich 2017; Thiel et al. 2016	12
Crowd sensing	Apostolopoulos et al. 2018; Bousios et al. 2017; Crowley et al. 2012; Martí et al. 2012; Mulyana et al. 2015; Rakhmawati, & Fibrianto 2016; dos Santos et al. 2015; Supendi & Prihatmanto 2015; Supriadi & Prihatmanto 2015; Susanto et al. 2017; Wei & Anwar 2017	11
Urban mobility & mapping	Kazhamiakin et al. 2016, 2015; Pang et al. 2017; Prandi et al. 2017; Poslad et al. 2015; Rui et al. 2015; Sandoval-Almazan & Valle-Cruz 2017; Semanjski et al. 2016	8
Welfare	Bista et al. 2012, 2014; Giangreco et al. 2014; Nepal et al. 2015; Paris et al. 2018	5
Energy	Carreira et al. 2017; Guzman & Clapp 2017	2
Civic learning	Fernandes & Junior 2016; Oceja & Fernández 2017)	2
Emergency & Law	Lindley & Coulton 2015; Romano et al. 2018	2
Elections	Foxman & Forelle 2014; Haleva-Amir 2016	2
Education	Williamson 2017	1
Opposition	Wang & Zhang 2017	1
Open data	Blazhko et al. 2017	1

research conducted on gamification of policy implementation, which, due to sheer volume, identified more negative results than is observed in the relatively less researched stages of policymaking. This can also be due to that most policy implementations require a level of behavioral change and such gamification is difficult to design in general (Hassan, 2017, 2018; Morschheuser, Hassan, Werder, & Hamari, 2018), especially if the change is or involves undesirable activities such as is often the case with exercise, or when the change is not being voluntarily chosen. Policy implementation remains highly connected to a top-down approach, where citizen comply with designer values which may not necessarily be in service of the public good (Harviainen & Hassan, 2019) or align with individual preferences. Such need for compliance with gamification to facilitate policy implementation might erode gamification from the voluntary user engagement needed for its success. Researchers are encouraged to investigate top-down implementations of gamification in e-participation and if they danger voluntary engagement with gamification or coerce compliance through a sugar-coat of gamification.

The enabling level of engagement with e-participation, as seen in Table 4, is the least researched level of gamified e-participation, with only 8 manuscripts discussing it. In contrast, other game-based approaches in, for example, urban planning highly utilize visualization techniques, such as, 2D and 3D maps, in enabling participation by informing citizens about their city (Duke, 1995; Sgueo, 2019). It has been suggested that these same informative visualizations can be gamified to employ citizens not only as consultants for urban planning but also as "sensors", uncovering problems in cities or mapping actual models of their environments into 2D and 3D maps to be used by policy makers in decision making (Klamert & Münster, 2017; Münster et al., 2017). In our literature study, we see that such implementations have already

Table 5
Summary of types of gamification reported in the reviewed manuscripts.

Element	Studies	#
Points	Bianchini et al. 2016a, 2016b; Bista et al. 2012, 2014; Bousios et al. 2017; Crowley et al. 2012; Foxman & Forelle 2014; Fernandes & Junior 2016; Hu & Chen 2015; Kazhamiakin et al. 2016, 2015; Lindley & Coulton 2015; Martí et al. 2012; Mulyana et al. 2015; Nepal et al. 2015; Olszewski et al. 2016; Opromolla 2015; Pang et al. 2017; Paris et al. 2018; Poslad et al. 2015; Prandi et al. 2017; Rakhmawati, & Fibrianto 2016; Romano et al. 2016, 2018; Supendi & Prihatmanto 2015; Thiel 2016a, 2016b; Thiel and Fröhlich, 2017; Thiel & Lehner 2015; Thiel et al. 2016; Weerawarna et al. 2017; Wei & Anwar 2017	32
User rankings, levels & leaderboards	Bianchini et al. 2016a, 2016b; Bousios et al. 2017; Crowley et al. 2012; Devisch et al. 2016; Fernandes & Junior 2016; Hu & Chen 2015; Kazhamiakin et al. 2016, 2015; Lindley & Coulton 2015; Martí et al. 2012; Mulyana et al. 2015; Pang et al. 2017; Rakhmawati, & Fibrianto 2016; Romano et al. 2016, 2018; Semanjski et al. 2016; Thiel 2016a, 2016b; Thiel and Fröhlich, 2017; Thiel & Lehner 2015; Thiel et al. 2016; Vogiatzi et al. 2017; Weerawarna et al. 2017; Wei & Anwar 2017	25
Goals, missions, to-dos, quests, tasks, challenges	Bianchini et al. 2016a, 2016b; Crowley et al. 2012; Fernandes & Junior 2016; Foxman & Forelle 2014; Kazhamiakin et al. 2016; Olszewski et al. 2016; Opromolla 2015; Pang et al. 2017; Rehm 2015; Romano et al. 2016, 2018; dos Santos et al. 2015; Semanjski et al. 2016; Supendi & Prihatmanto 2015; Supriadi & Prihatmanto 2015; Thiel 2016a, 2016b; Thiel and Fröhlich, 2017; Thiel & Lehner 2015; Thiel et al. 2016; Tolmie et al. 2014; Weerawarna et al. 2017	23
Achievements, badges, medals	Bianchini et al. 2016a, 2016b; Bista et al. 2012, 2014; Fernandes & Junior 2016; Hu & Chen 2015; Kazhamiakin et al. 2016, 2015; Mulyana et al. 2015; Nepal et al. 2015; Paris et al. 2018; Rakhmawati, & Fibrianto 2016; Rehm 2015; Thiel & Lehner 2015; Vogiatzi et al. 2017; Weerawarna et al. 2017	16
Competition	Bianchini et al. 2016a, 2016b; Bousios et al. 2017; Devisch et al. 2016; Hu & Chen 2015; Martí et al. 2012; Pang et al. 2017; Rakhmawati, & Fibrianto 2016; Rehm 2015; dos Santos et al. 2015; Susanto et al. 2017; Thiel & Fröhlich 2017; Thiel et al. 2016; Wei & Anwar 2017	14
User profiles	Bianchini et al. 2016a, 2016b; Devisch et al. 2016; Fernandes & Junior 2016; Mulyana et al. 2015; Prandi et al. 2017; Rehm 2015; Romano et al. 2018; Semanjski et al. 2016; Thiel 2016a, 2016b; Thiel & Fröhlich 2017; Thiel & Lehner 2015; Thiel et al. 2016	14
Location tagging,	Devisch et al. 2016; Foxman & Forelle 2014; Martí et al. 2012; Mulyana et al. 2015; Olszewski et al. 2016; Pang et al. 2017; Prandi et al. 2017; Rehm 2015; Thiel 2016a, 2016b; Thiel & Fröhlich, 2017; Thiel & Lehner 2015	12
Posting, sharing, commenting	Bianchini et al. 2016a, 2016b; Crowley et al. 2012; Devisch et al. 2016; Martí et al. 2012; Mulyana et al. 2015; Pang et al. 2017; dos Santos et al. 2015; Susanto et al. 2017; Thiel and Fröhlich, 2017; Thiel & Lehner 2015; Tolmie et al. 2014	12
Time constraints	Crowley et al. 2012; Pang et al. 2017; Rakhmawati, & Fibrianto 2016; Rehm 2015; Thiel 2016a, 2016b; Thiel & Fröhlich 2017; Thiel & Lehner 2015; Thiel et al. 2016; Weerawarna et al. 2017; Wei & Anwar 2017	11
Ideas rankings, likes & leaderboards	Bianchini et al. 2016a, 2016b; Crowley et al. 2012; Devisch et al. 2016; Pang et al. 2017; Rehm 2015; dos Santos et al. 2015; Susanto et al. 2017; Thiel and Fröhlich, 2017; Thiel & Lehner 2015	10
Rewards, prizes, incentives	Crowley et al. 2012; Foxman & Forelle 2014; Kazhamiakin et al. 2016, 2015; Olszewski et al. 2016; Prandi et al. 2017; Semanjski et al. 2016; Sandoval-Almazan & Valle-Cruz 2017; Supendi & Prihatmanto 2015; Supriadi & Prihatmanto 2015	10
Cooperation, teams, player communities	Crowley et al. 2012; Foxman & Forelle 2014; Olszewski et al. 2016; Pang et al. 2017; Rehm 2015; Semanjski et al. 2016; Thiel & Lehner 2015	7
Progress bars	Martí et al. 2012; Rehm 2015; Semanjski et al. 2016; Supriadi & Prihatmanto 2015; Thiel 2016b; Thiel & Lehner 2015	6
Reputation systems	Crowley et al. 2012; Thiel 2016a, 2016b; Thiel & Lehner 2015; Thiel et al. 2016)	5
Stories, characters	Devisch et al. 2016; Kazhamiakin et al. 2016; Opromolla 2015; Prandi et al. 2017; Tolmie et al. 2014	5
Social media integration	Devisch et al. 2016; Foxman & Forelle 2014; Hu & Chen 2015; Rehm 2015; dos Santos et al. 2015	5
Notifications	Crowley et al. 2012; Devisch et al. 2016; Olszewski et al. 2016; Rehm 2015	4
Feedback	Crowley et al. 2012; Supendi & Prihatmanto 2015; Supriadi & Prihatmanto 2015	3
Newsfeed	Pang et al. 2017; Rehm 2015; Semanjski et al. 2016	3
Punishments	Bousios et al. 2017; Hu & Chen 2015; Wei & Anwar 2017	3
Avatars	Devisch et al. 2016; Martí et al. 2012	2
AR	Devisch et al. 2016; Prandi et al. 2017	2
Forum, chat	Devisch et al. 2016; Foxman & Forelle 2014	2
Player roles	Devisch et al. 2016; Opromolla 2015	2
Rules	Supendi & Prihatmanto 2015; Supriadi & Prihatmanto 2015	2
Hardware	Lindley & Coulton 2015	1
Emoticons	Thiel and Fröhlich, 2017	1
Memes	Haleva-Amir 2016	1
Downvoting	Crowley et al. 2012	1

been taking place, advancing 2D and 3D modeling in urban planning from tools that enable participation to tools that engage citizens in data gathering and mapping (e.g., Bousios et al., 2017; Pang et al., 2017; Prandi et al., 2017; Romano et al., 2018; Susanto et al., 2017; Wei & Anwar, 2017). Gamification implementations, hence, appear more geared towards engaging citizens beyond the basic first level of enabling participation. There are, however, high needs to ensure the usability of and enjoyable access to governmental information and, for example, documents that are published openly online (Madariaga, Nussbaum, Marañón, Alarcón, & Naranjo, 2019) so that perhaps citizens can become more informed about their communities through these documents, ensuring that the gamified tools enable informed engagement rather than engagement void of reliance on evidence or information, commonly thought to be the root of fake-truth and other mal-practices observed online (see Suiter, 2016). Researchers are encouraged to investigate the gamification of the enabling level of e-participation to facilitate the creation of well-informed citizens needed in the age of misinformation and fake news.

The majority of the reviewed corpus (41 manuscripts) focused on engaging citizens in relatively limited two-way citizen participation, compared to 10 publications that investigated empowerment and equal co-production between citizens and governments. This ratio is surprising as gamification has been projected to be a powerful means to facilitate deeper and more involved partnerships between governments and citizens (Klamert & Münster, 2017; Opromolla, 2015), however, research does not seem to be exploring how gamification can foster

Table 6
Summary of reported positive and negative empirical findings on gamification in E-participation.

	Positive outcomes from gamification in e-participation		Negative outcomes from gamification in e-participation	
	Description	Sources	Description	Sources
Cognitive	Perceived usefulness of gamification	Bousios et al., 2017; dos Santos et al., 2015; Supendi & Prihatmanto, 2015; Romano et al., 2018; Brunet et al., 2018	Perceived cognitive load or distractions from the task at hand	Tolmie et al., 2014; Brunet et al., 2018
	Learning/perception of learning	Ampatzidou et al., 2018; Devisch et al., 2016; Olszewski et al., 2016; Sandoval-Almazan & Valle-Cruz, 2017		
	Understanding of users of the service	Bista et al., 2012, 2014; dos Santos et al., 2015; Wei & Anwar, 2017		
Motivational	Motivation, engagement	Devisch et al., 2016; Fernandes & junior 2016; Foxman & Forelle, 2014; Haleva-Amir, 2016; Kazhamiakin et al., 2016; Prandi et al.2017; Rehm, 2015; dos Santos et al., 2015; Thiel, 2016b; Thiel & Fröhlich, 2017; Thiel & Lehner, 2015; Wei & Anwar, 2017; Paris et al., 2018; Romano et al., 2018	Lack of significant change to motivation Demotivation, avoidance	Thiel et al., 2016; Thiel, 2016a; Thiel & Fröhlich, 2017
Emotional	Enjoyment, fun	Bianchini et al., 2016a, 2016b; Lindley & Coulton, 2015; Prandi et al.2017; Thiel, 2016b; Romano et al., 2018; Brunet et al., 2018	Skepticism	Ampatzidou et al., 2018; Bousios et al., 2017; Thiel, 2016b; Brunet et al., 2018
	Satisfaction, playfulness, entertainment and other positive emotions	Bousios et al., 2017; Haleva-Amir, 2016; Hu & Chen, 2015; dos Santos et al., 2015; Thiel & Fröhlich, 2017	Anxiety, annoyance	Prandi et al.2017
Social	Perception of sociability and relatedness	Haleva-Amir, 2016; Sandoval-Almazan & Valle-Cruz, 2017; Thiel, 2016b; Paris et al., 2018	Hyper competitiveness, negative social behavior	Foxman & Forelle, 2014
	Recognition and social influence	Lindley & Coulton, 2015; Thiel & Fröhlich, 2017		
Behavioral	Behavioral change in different contexts	Foxman & Forelle, 2014; Kazhamiakin et al., 2015; Kazhamiakin et al., 2016; Poslad et al., 2015; Semanjski et al., 2016;	Cheating, gaming the system	Haleva-Amir, 2016
	Participation	Bianchini et al., 2016a, 2016b; Bista et al., 2012, 2014; Foxman & Forelle, 2014; Hu & Chen, 2015; Kazhamiakin et al., 2015; Olszewski et al., 2016; Prandi et al.2017; Rakhmawati et al. 2016; Rehm, 2015; dos Santos et al., 2015; Sandoval-Almazan & Valle-Cruz, 2017; Thiel & Fröhlich, 2017; Wei & Anwar, 2017; Paris et al., 2018;	Activity related mistakes or low-quality participation	Thiel, 2016a; Tolmie et al., 2014
	Enhanced participation quality	Bianchini et al., 2016a, 2016b; Wei & Anwar, 2017; Paris et al., 2018;		
	Use intentions or acceptance of gamification	Lindley & Coulton, 2015; Opromolla, 2015; Prandi et al., 2017; Supendi & Prihatmanto, 2015; Romano et al., 2018; Semanjski et al., 2016; Susanto et al., 2017;		

empowered interaction with the government. Researchers are encouraged to investigate the e-participation levels of empowering to uncover if and how gamification can foster engagement practices able to facilitate empowered collaborations with a government.

While most of the reviewed research appears to understand gamified e-participation in terms of a cooperation with the government that supports rather than challenges its policies, one study was observed to explicitly discuss gamified e-participation as a means of governmental opposition (Wang & Zhang, 2017), and another framed it as a means of critical reflection on politics and election (Haleva-Amir, 2016). Gamification as an engagement strategy can be employed by citizens as well as by governments, hence, gamified (e)participation does not necessarily have to be supportive of governmental policies but can also be employed critically and perhaps playfully to influence governmental practices (Hassan & Thibault, 2020). Such implementations, however, may not necessarily be constructive and there is a danger that they represent a double-edged sword that can be democratically constructive as well as disruptive. Future researchers are encouraged to investigate how gamification can be, and is already being used, as a means of organizing oppositions to governmental policies.

More largely in terms of e-participation contexts, as can be seen in Table 4, it appears that generic research is the most popular, often characterizing itself as research on civic engagement at large. While a generic study of e-participation is presumably of relevance to most implementation contexts of gamified e-participation, generic research is likely to make contextualized implementations of gamification more challenging as researchers would need to exert additional work in contextualizing generic knowledge to their purposes. Along with this observation is that many of the gamified e-participation contexts in the reviewed literature lack research. Specialized targeted research in relatively uninvestigated contexts, − such as, for example, law enforcement, elections, campaigning, petitioning, civic education or processing of open governmental data - rather than generic research, would be better suited to help concluded when and where gamification could be of value to society. Researchers are encouraged to investigate gamification in specific implementation contexts or for specific civic objectives rather than for generic purposes.

4.3. Gamification types

This section presents the types of gamification identified in the reviewed empirical research corpus. With regards to the coding of the gamification elements in Table 5, we adhered to what the authors of the reviewed manuscripts reported as gamification elements with no addition or subtractions from their reports. The authors of the reviewed manuscripts often differed in what they considered or did not consider as gamification elements, leading to some, for example, considering social features as gamification (Bianchini et al., 2016a, 2016b; Crowley et al., 2012; Devisch et al., 2016; dos Santos et al., 2015; Martí et al., 2012; Mulyana et al., 2015; Pang et al., 2017; Thiel & Fröhlich, 2017; Thiel & Lehner, 2015; Tolmie et al., 2014), while others did not (Bianchini et al., 2016a; Hu & Chen, 2015; Rakhmawati & Fibrianto, 2016; Thiel, 2016a, 2016b; Thiel et al., 2016). Similarly, some researchers considered the observed popularity in satire and memes during elections as gamification of elections (Haleva-Amir, 2016), while none of the remaining corpus posited memes as means of gamification. Differences in what is or is not considered gamification elements are not foreign to gamification research (Huotari & Hamari, 2017; Landers et al., 2018), with recent observations being that gamification elements are often defined from the perspective of the designers of gamification and are constantly evolving and changing rather than being a standardized list (Hassan, 2018).

The most commonly employed element of gamification is points. Naturally, points are a basic design element without which several other gamification elements would not be operational such as leaderboards, user rankings or idea rankings. Elements that rank users in a competitive manner such as levels and leaderboards are the second most popular gamification elements employed in e-participation (Table 5). Competition fuels engagement and the repetitive use of a service (Morschheuser, Maedche, & Walter, 2017), hence these findings are not unwarranted as the main purpose of gamified e-participation has been observed to be increasing engagement. Yet, competition also often leads to negative behavior between users such as hyper competitiveness, bullying and attempts to break the system for one's benefit (Foxman & Forelle, 2014; Thiel & Lehner, 2015). It is hence interesting to observe that a number of implementations in the reviewed corpus attempted to shift the focus of the competition from a competition between users to one between ideas (Bianchini et al., 2016a, 2016b; Devisch et al., 2016; dos Santos et al., 2015; Rehm, 2015), often employing leaderboards of ideas instead of or next to leaderboards of users.

Depending on personality, users might react to idea-based competitions by cooperating more with each other on crafting and getting the best ideas to win, or they might still engage in hyper-competitive, negative behavior amongst each other to contribute the best idea themselves rather than cooperate on one with others (Rehm, 2015). While hyper-competitive behaviors could still emerge in idea-based competitive gamification, there is at least a possibility through it for cooperative, group advancing behavior to emerge within the competition. Future researchers are encouraged to investigate designs that mix competition and cooperation such as through idea-based competitions to uncover the extent to which and the conditions under which they can foster a positive mix of competition and cooperation.

4.4. Overview of the outcomes reported from gamified e-participation

Table 6 presents a summary of the positive, negative and mixed outcomes from gamified e-participation as reported by the reviewed empirical research corpus. It is, important to note that while Table 6 reports on findings from empirical research, a considerable part of the empirical research identified in our review did not explicitly report or conduct evaluation of the gamification that was implemented in their research (e.g., Apostolopoulos et al., 2018; Crowley et al., 2012; Bulos et al. 2014; de Dios Giangreco et al., 2014; Guzman & Clapp, 2017; Martí et al., 2012; Mulyana et al., 2015; Münster et al., 2017; Pang et al., 2017; Supriadi & Prihatmanto, 2015; Vogiatzi et al., 2017; Weerawarna et al. 201).

The findings reported in Table 6 have been summarized within the framework Koivisto and Hamari (2019) provide for summarizing and presenting outcomes from gamification. Table 6 can, hence, be contrasted against the previously reported outcomes from gamification in general, previously reported in Table 2. Such comparison highlights that the findings obtained within the gamified e-participation field falls within the parameters of what research has uncovered on gamification in other implementation contexts. Notable exceptions are that the range of findings on gamified e-participation Is relatively small, compared to Koivisto and Hamari's (2019) full list of outcomes reported from gamification in other fields. For example: gamified e-participation research does not report on experiences of flow and immersion nor experiences around social pressure and anxiety. This suggests that either the range of outcomes from gamification in e-participation is relatively smaller compared to other gamification fields, or, more likely, that the range of measured outcomes from gamified e-participation researched needs to be expanded. We encourage gamified e-participation

researchers to further expand the set of outcomes they measure or report on in their research so as to enhance our understanding of the positive and negative outcomes from e-participation.

Generally, a significantly large portion of the reviewed corpus reported positive outcomes from gamification in e-participation. Gamification is often associated with or causes learning, perception of learning and a better understanding of citizens when they are users of a gamified e-participation service, where they contribute their opinions and thoughts. Additionally, gamification often associated with or caused positive motivational, and affective experiences, such as those of enjoyment, fun and playfulness. Gamification, finally, often associated with or caused increased participation or a change in behavior, such as increased use of sustainable transport. Gamification, in-line with previous observations (Klamert & Münster, 2017; Münster et al., 2017), creates interaction and feedback loops between governments and citizens. Implementations of ideas/policies/decisions originating from or refined by citizens often lead to increased citizens support for these ideas/policies/decisions as well as increased future citizen involvement in e-participation as seen with, for example, Community Planit (Gordon & Baldwin-Philippi, 2014). Gamification, also in-line with previous projections (Opromolla, 2015; Opromolla et al. 2017), is seen to facilitate eco-friendly, responsible societies by incentivizing citizen implementations of eco-friendly policies (e.g., Carreira et al., 2017; Guzman & Clapp, 2017; Kazhamiakin et al., 2015).

Increased engagement and participation associated with gamification is generally considered a positive outcome reported by a large portion of the reviewed corpus of research and is arguably one of the key main goals from introducing gamification to e-participation/ Hassan, 2017, 2018). Nonetheless, it has been debated in the (e-)participation literature whether increased levels of participation are desirable to begin with (Arnstein, 1969; Conge, 1988). Increased (e-) participation increases processing costs of that input, may pose pressures on decision makers that deter them from rational decision making in favor of decisions that would please the populace and may allow for organized campaigns by interest groups that may overshadow the opinion of others, especially that of minorities (Sgueo, 2018). Notable, although scarce, research that has examined gamified e-participation quality, found it enhanced (Bianchini et al., 2016a, 2016b; Wei & Anwar, 2017; Paris et al., 2018;) by gamification or in association with it, while other research has uncovered increased mistakes and decrease in participation quality associated with or caused by gamification (Thiel, 2016a; Tolmie et al., 2014), making it hard to conclude the impact of gamification on participation quality. Researchers are encouraged to not only report on the quantity of engagement associated with gamification but also to examine and report on its quality, diversity, and the duration said engagement lasted for. Furthermore, researchers are encouraged to investigate the safe, secure and productive inclusion of traditionally marginalized groups in (gamified) (e-)participation.

The scarcely reported negative outcomes from gamified e-participation mainly pertained to low engagement levels with the gamified tools under research. Questions remain as to whether the relatively overwhelming number of studies reporting on positive outcomes from gamification are an indicator of the success of the technique in driving engagement in e-participation or is merely due to failed or negative results being scarcely reported on (Hassan et al., 2018) or extensively analyzed (Toots, 2019). Previous literature reviews have indicated a tendency towards a publication bias in reporting outcomes from gamification that could skew how much negative outcomes from gamification are reported and our understanding of them (Hamari et al., 2014; Koivisto & Hamari, 2019). Researchers are encouraged to report on failed, incomplete, or struggling implementations as they offer insights that inform future research.

Some of the reviewed research extensively reported user and context analyses that were conducted during gamification design (e.g., Bista et al., 2012, 2014; Prandi et al., 2017; Rehm, 2015; Sandoval-Almazan & Valle-Cruz, 2017), while other research failed to report such analyses (e.g., Supriadi & Prihatmanto, 2015; Thiel & Fröhlich, 2017). A danger here is that these analyses are not conducted in the first place, threatening the success of said gamification (Hassan, 2018; Morchhauser et al. 2018; Thiel, 2016c; Toots, 2019). However, if these analyses are being conducted but are merely not reported in the literature, then the logic and process of gamification design remain in a relative black box, inaccessible to other researchers and practitioners in the field, possibly slowing down the development of gamified e-participation practices by keeping design logics inaccessible to future researchers and practitioners. We highly encourage researchers to report on their design processes, providing rationales for their designs as this can inform future implementations and help advance gamified e-participation practice.

4.5. Synthesis of the findings and lessons learned

It is evident from observing the publication dates of the reviewed research corpus that there is pervasively increasing effort spent on the research and utilization of gamification in facilitating citizen involvement in governance, in general, and in e-participation, in specific. Several pertinent questions in this research and practice have been observed to be subject of interest, such as, for example, how to implement gamification in e-participation? to whom would such gamified participation be most accessible and useful? And what would be the positive and negative outcomes from gamification in e-participation? While the systematic review conducted in this article sheds light on the overall state of the corpus, more nuanced addressment is also due. Therefore, in this section we synthesize some of the main aspects related to these pertinent questions.

In which contexts of e-participation is gamification researched and utilized: Gamification is being researched and utilized in various sub areas of e-participation as has been outlined in Section 4.2 and Table 4. Holistically, however, while the contexts of implementation in the reviewed research seem to vary or are sometimes altogether undefined, the common objectives of these implementations are to engage citizens with the government, rather than to inform citizens about governmental processes or to empower citizens to become equal actors to the government. In connection with this observation is that the popular contexts of gamification implementations are those that 1) encourage citizens to provide governments with some input, such as through crowdsensing (e.g., Rakhmawati & Fibrianto, 2016; Supendi & Prihatmanto, 2015), 2) encourage citizens to implement newly passed policies such as those pertaining to fostering sustainable behaviors (e.g., Kazhamiakin et al., 2015), Most of these researched implementations are, hence, top-down and structured, although gamification has the potential to facilitate bottom-up participation, which is also seen in the literature in the forms of sarcasm-centered, unintentional gamification of election processes (e.g., Haleva-Amir, 2016), and similarly, unintentional gamification of activity intended to oppose governmental policies (e.g., Wang & Zhang, 2017).

It appears, from the reviewed literature, that when citizens initiate e-participation, gamification occurs unintentionally as a byproduct of decentralized citizenry behavior. We, however, did not identify and gamified e-participation citizen activity that attempted to work in cooperation with the government or within explicitly, legally-accepted

frameworks for opposition to government. This perhaps reflects a natural tendency in humans to be more vocal and active about criticism and change, even outside dedicated feedback channels. In such situations, perhaps, citizens see gamification as a rather less serious and also an enjoyable, organized approach to express opposition of the government. The existence of this research, although rare, showcases the potential of gamification in facilitating different types of e-participation, e.g., bottom-up, according to the context and purposes of its utilization, than has been previously observed with e.g., policy games.

Who is gamified participation engaging for: Although the majority of the reviewed research highlights that gamification in e-participation can lead to positive outcomes, these outcomes, however, may not be universally, equally experienced by all target groups. The digital divide and equal access are concepts of high relevance to e-participation (Lee-Geiller & Lee, 2019; Sæbø et al., 2008; Sgueo, 2018, 2019). It is possible that gamification in the context of e-participation, would positively influence people's belief in their participatory abilities (self-efficacy), encouraging them to participate more. This is because gamification in general (Huotari & Hamari, 2017) and in e-participation in specific (Hassan, 2017; Sgueo, 2019), aims to positively impact people's feelings of mastery and competence so that individuals feel competent to engage with the gamified activities in question.

Nonetheless, gamification, similar to other e-participation means (see Sæbø et al. (2008) for reviews), can strengthen access to the government for certain segments of a populace that are technologically or educationally advantaged, while weakening it for other, relatively-disadvantaged or uninterested segments, leading to biases in governmental decision-making (Gurstein, 2003; Thiel, 2016c). Gamification can hence become counterproductive in certain context of e-participation if it, for example, creates an additional access divide rather than strengthens individual's participatory abilities (Ampatzidou et al., 2018; Asquer, 2014; Hassan, 2017; Thiel, 2016b; Thiel & Lehner, 2015). Research indicates that affinity towards games positively correlated with perceptions of gamification and engagement with it (Thiel, 2016a, 2016b; Thiel et al., 2016). This may lead support to the assumption that gamification is perhaps most suitable to attract participants of young ages. With some studies explicitly reporting the skepticism of older generations towards gamification (Fernandes & Junior, 2016; Thiel et al., 2016. Hence, worthy of special note is a study by Devisch et al. (2016) in which they especially note the willingness of elder participants to engage with gamification, especially when it eliminated their physical mobility challenges that inhibit their participant with governance. Lindley and Coulton (2015) provide another example of a highly creative work, conducted with retired law enforcement officers, on the regulation of drone activity through gamification and gaming controllers. The study reports the readiness of this relatively elder group, to engage with, not only enjoyable, gamification, but gamification that has given them a renewed sense of purpose.

These studies suggest that perhaps the skepticism we see from elder groups towards gamification is not because of gamification in and of itself, but rather because of unsuitably designed gamification. Gamification designs that attempt to connect to the needs and motivations of elderly groups yield exceptionally positive results, especially when that research involves extensively user and context analysis. Generallt, we observed that studies that reported extensive user and context analysis similarly reported positive perceptions and acceptance of gamification (Kazhamiakin et al., 2015; Olszewski et al., 2016; Poslad et al., 2015), suggesting that gamification's success, in any context, is about how it is designed in connection to target user groups, as previous research in other contexts outside e-participation indicates (Morschheuser et al., 2018).

While a part of the reviewed research has investigated equal access, especially the inclusion of marginalized group, such as the elderly, almost none of the reviewed research has investigated the inclusion of otherwise marginalized groups based on race, gender, sexual orientation or disability. Questions remain about gamification's ability to be inclusive of marginalized groups, and whether gamification can accidentally create situations of risk by exposing the identities of minority to targeted malicious behavior online (Sgueo, 2018, 2019).

How is gamified e-participation being researched: The research field of gamified e-participation appears highly geared towards obtaining primary insights as highlighted by the number of empirical, compared to theoretical work identified in our review. Such orientation is of significant importance to any emerging research field, however, the relative dearth in research focused on confirmatory studies or on the development of theory or theoretical frameworks, may indicate that the research field has not yet reached a high level of maturity. Furthermore, most of the empirical research reported on experimental implementations that represent proves of concepts, used for short periods to prove the validity of an idea. The reviewed corpus rarely reported on longitudinal gamification implementations or on ones that are being actively used in practice, although such implementations reportedly exist and are discussed in the media and grey literature.

Hence, worthy of note here, out of the reviewed research corpus, is the relatively comprehensive and longitudinal study of a gamified platform to facilitate citizens' transition from one welfare system to another, which was reported on by several studies (Bista et al., 2012, 2014; Nepal et al., 2015; Paris et al., 2018). The platform was designed in cooperation with a governmental agency and was utilized for real rather than experimental purposes. Researchers observed increased and consistent activity levels on the platform during the year it was utilized for, with participants expressing their gratitude for the platform. In specific, participants have reported it to be useful, not only in terms of helping them cognitively understand the transition but also in allowing them to share their stories and find solidarity with others. Examination of the participation quality on the platform supports these findings (Paris et al., 2018), although, a concern is that perhaps the presence of governmental officials on the platform inhibited free expression of unhappiness with the government to an extent, although, such presence facilitated a channel of direct feedback that participants, nonetheless, found useful. While these studies, amongst others, paint a positive picture of gamification supporting participation quantity, quality and social relatedness during transitional times, as this research lacked a comparative, experimental design, the extent to which these findings can be interpreted as gamification specific is limited as the researchers who executed this work note themselves (Bista et al., 2012, 2014).

We, hence, highlight studies that utilized experimental designs to compare gamified participation to non-gamified participation. TAB sharing is one such platform that was utilized for a long period of time and developed after an extensive user and context analysis in cooperation with the government (Bianchini et al., 2016a, 2016). Researchers report increased activity after gamification and improvements to participation quality compared to base levels. Smaller scale experiments in which gamified implementations are experimentally compared against non-gamified implementations, reported similar results that show increased engagement and participation on gamified compared to non-gamified interfaces and apps (Fernandes & Junior, 2016; Kazhamiakin et al., 2015), while some experiments were inconclusive (Bousios et al., 2017).

Who is conducting gamified e-participation research: While

governments, historically, have been involved in research pertaining to gaming and games in government (e.g., Duke, 1995, 2000, 2011) as well as in research on e-participation at large (Sæbø et al., 2008) and although the government is a main stakeholder in this line of research, by its mere nature, surprisingly, we observed little governmental involvement in gamified e-participation research at large. Most of the reviewed research corpus is of gamification implementations by or in cooperation with independent universities, research institutes, societal actors, advocacy groups or NGOs (Sgueo, 2018). Many researchers, hence, had to simulate a governmental presence on the gamified tools they were researching to simulate realness to research participants (e.g., Devisch et al., 2016; Thiel, 2016a; Thiel & Fröhlich, 2017; Thiel & Lehner, 2015).

While researchers and societal actors seem to exhibit enthusiasm and high hopes for gamified e-participation, policy makers in the reviewed literature have mostly expressed skepticism of gamification, while, nonetheless, reporting, in the same studies, that they have utilized it, and games in general, in effectively driving public engagement (Ampatzidou et al., 2018; Brunet et al., 2018). Other officials moved beyond skepticism and utilized gamification to longitudinally drive civic engagement in cooperation with researchers (Bianchini et al., 2016a, 2016), as well as to longitudinally support the implementation of policies, such as new welfare policies (Bista et al., 2012, 2014). Governments also cooperated in research where citizen involvement at a large scale, for crowd sensing and maping purposes (Sandoval-Almazan & Valle-Cruz, 2017) or for idea generation (Olszewski et al., 2016), was being researched. Observing the contexts where governments were involved perhaps suggests that the main interest of the government in this research is in bringing about desired citizenry cooperation, mainly in the utilization and management of crowds. The lack of government involvement, in general, in this research line, could also hint at a relative lack of channels of contact with governments that many researchers and practitioners have not been able to secure such involvement. Research involving the government can additionally impose unique legal and innovation constraints (Toots, 2019) that researchers might want to avoid altogether.

How to implement gamified e-participation: The types of gamification seen in the literature extensively varied. While it would be of significant value to provide recipes for the design of successful gamification, it clearly appears from the reviewed literature that there are different ways to implement gamification for different purposes and receive positive outcomes. Furthermore, with the outlined lack of confirmatory or experimentally comparative studies, we furthermore, find it challenging to draw, explicit, conclusive recommendations for gamified e-participation. Nonetheless, we provide Appendix A as a tool to aid in the design of gamification. Appendix A maps the identified gamification elements in the reviewed corpus to e-participation engagement level, contexts, and policymaking stage at which each of these elements were observed. It is clear from the appendix that there are elements which are relatively more popular in one e-participation engagement level or context over others. For example, points are heavily employed by most research at the monitoring and implementation stage of policymaking. Appendix A can, furthermore, provide indicators as to which gamification designs could be suitable to facilitate which type of engagements and in which e-participation context. For example, employing rules in gamification appears to be, generally, less popular but popular in facilitating crowdsensing and problem reporting. This is perhaps due to how rules can provide the crowd directions for their activity as well as outline possible positive and negative outcomes from abiding by or breaking the sensing rules, ensuring that the crowd delivers according to designers' needs (Opromolla, 2015).

Nonetheless, we encourage researchers to adopt an understanding of gamification focused on facilitating engaging experience through the most suitable means, rather than through the classically popular means (e.g., points, and badges), Compared to previous reviews on gamification in civic engagement (Thiel, 2016c), it indeed does appear that the range of gamification elements researched in e-participation is expanding beyond the classically popular elements (Opromolla, 2015; Opromolla et al., 2016). Researchers and practitioners are further encouraged to research and introduce new gamification designs and elements as technology advances and needs evolve. Similarly, more research is needed to investigate gamification elements that have not yet been investigated in the different areas of e-participation as can be identified from Appendix A.

Overall, the majority of the reviewed empirical corpus reports positive findings from gamification, especially in terms of experiences of enjoyment and increased engagement with e-participation. These positive findings are often reported with little in-depth analysis or problematization of the reported results. Consequently, while the reviewed research does paint a positive picture of the utilization of gamification in e-participation, most of the findings, do not, yet, fully reflect actual practice or full reality. Significantly more research is needed, especially longitudinal, experimentally comparative, well documented research, for us to better understand the implications of gamification in governance processes.

5. Limitations

This work conducted a literature study of the corpus of research on gamified e-participation. It adopted a summarization of knowledge approach that is systematic rather than being an interpretivist approach to the review of a given corpus of literature. While systematic reviews are generally highly regarded as important and methodologically rigorous - because they do not attempt to assign weights to, make selections from or employ subjective valuation of the corpus being reviewed, − such reviews are limited by these same advantages as they treat all studies as equal without providing valuations or a larger narrative interpretation of the corpus being reviewed. Nonetheless, such systematic, summative reviews tend to form a base for following interpretivist approaches. We encourage future research to further interpret the reviewed studies, provided by our work, and to build and discuss emergent themes from the examined literature.

This research, naturally, is limited in scope, first, with regards to how the two main “variables” of the research “e-participation” and “gamification” where defined. *E*-participation was defined in Ann Macintosh's (2004) terms as engagement with the policymaking process. Said definition was wide enough that it allowed for the inclusion and study of a wide range of gamified e-participation in this work, yet, this remains a singular definition that limits the scope of this work. Gamification, similarly, has various definitions and is often used interchangeably with closely connected terms such as games or serious games. This research coded gamification and its types according to how the authors of the reviewed corpus characterized it, leading to a degree of abstraction in the study as is often observed in reviews of gamification research (e.g., Koivisto & Hamari, 2019). While such abstraction is needed to develop a holistic understanding of the gamified e-participation scene, it waters down nuances in the reviewed corpus.

While the review procedure, coding and analysis of the reviewed corpus have been conducted by an experienced researcher who has done extensive research both on gamification and e-participation, any

research is prone to human errors. Furthermore, this literature study is also limited by the limits of the Scopus database that was used in the literature query as well as by the query itself that was employed. As such, it is possible that although rigor has been employed in choosing the query keywords, database and in implementing the review procedure, the study may have failed to comprehensively identify and review relevant literature that was not indexed in the employed database or that did not contain the keywords employed in the query or due to human error in implementing the review procedure. Hence, the coded results and the search procedure have been described at length to allow the readers of this work to evaluate and possibly replicate the literature study and coding, if they so wish.

6. Conclusion

In recent years, we have witnessed an increased pervasive utilization of gamification to foster citizen engagement with governance through e-participation amongst other means. This, at its best, is arguably an endeavor to progress the democratic-ness of governance or at least to progress its efficiency. However, there have remained several gaps in our knowledge of said gamification. Gamification is mostly seen as a technological development that would not only provide the infrastructure to facilitate a wider range of direct democracy but would additionally incite the human motivation to participate. Nonetheless, democratic governance and gamification are an especially intriguing combination since several polarizing facets emerge in their juxtaposition, i.e. whereas governance is commonly connected to serious, persistent and systematic practices, playing games has traditionally been regarded a foolhardy activity without any instrumental outcomes. This conceptual contrast, along with many others, perhaps primarily stems from how both governance and games have popularly been understood in dated conceptualization. They, nonetheless, provide interesting avenues for further investigation of gamification in relation to democratic governance and e-participation.

Therefore, in order to initiate systematic efforts to address these knowledge gaps, in this study, we conducted a systematic review of the corpus of literature on gamification in e-participation so as to develop a holistic understanding of the work that has been conducted thus far in this field and provide future research directions. The findings show that gamification has been investigated in several contexts of e-participation, such as in crowd sensing, welfare and energy management, urban planning, urban mobility and mapping, government opposition, civic learning, emergency response, law enforcement, as well as in elections. Most research, however, investigated gamification as a method for e-participation generalizable widely to all e-participation contexts. Contextualized research in the contexts outlined as well as in other contexts that have not been researchered yet, such as, for example; campaigning, petitioning, voting, and taxation, is highly needed to uncover the contexts and conditions under which gamification can have a positive or a negative impact.

Gamification has, similarly, been investigated in all three levels of citizen engagement outlined by Macintosh (2004): empowering, engaging and enabling, showing that the extant corpus is well versed in considering the spectrum of citizen participation, however, research remains scarce with regards to the engagement levels of empowering and enabling. Without enabling basic access to information, those who engage in e-participation may not be well- educated so as to build informed opinions. On the other hand, without enabling empowered engagement, bottom-up implementations would remain hard to emerge, depriving society of the innovativeness that often comes through it. Researchers are hence encouraged to investigate the gamification of the enabling and empowering levels of e-participation.

The extant corpus widely covers the stages of policy making; agenda setting, analysis, creation, implementation, and monitoring. The implementation stage has been the most researched while the creation stage of policymaking has been the least researched and in need of further investigation. The types of gamification seen in the literatures varied. Points, leaderboards, missions and competition were the most popular, although a few researchers focused on relatively niche implementations such as those involving memes, AR, or hardware controls. Future researchers are encouraged to examine the relatively uninvestigated gamification types so as to develop a broader understanding of its practices beyond the popular ones. A considerable part of the literature investigated the use of gamification in the "creation of good citizens" raising concerns and needs to research power dynamics, paternalism and ethics of gamification.

The majority of the reviewed corpus utilized design, prototyping and implementation methods, most notably in combination with quantitative methods such as log data analyses and surveys. Most of this research was of proofs concepts, used for short periods to prove the validity of an idea. Consequently, while the majority of the reviewed empirical corpus reported positive outcomes from gamification, these positive outcomes are, however, often reported with little in-depth analysis or problematization and most of the findings perhaps do not fully reflect actual practice. Government involvement in gamification research is limited and perhaps this creates challenges in research access, and this can explain why the tools that are currently maintained by governments, as seen in the media and grey literature, are not reflected upon in academic literature. Increasing government involvement in this research is imperative to breach classical gaps between academia and practice. Furthermore, longitudinal research is needed, perhaps through qualitative methods, next to quantitative, to uncover more nuance in the observed results from gamified e-participation. Researchers of gamified e-participation are encouraged to adopt critical perspectives, looking beyond the observed positive impact of gamification on engagement, to investigate nuance pertaining to inclusion, power dynamics, freedom of choice as well as the use of gamification by citizens in bottom-up approaches to support and oppose governmental practices.

Acknowledgements

This work was supported by the Finnish Foundation for Economic Education (grants: 12-6385 and 14-7824), the Finnish Cultural Foundation (grants: 00190298), and the Centre of Excellence on GameCulture Studies (GameCult), Fnland.

Appendix A. Mapping of the technological tools and game elements identified in the reviewed literature to the e-participation focus, level and policymaking stage at which they occur

Tech	*E*-participation context							
	General/unspecified	Welfare management	Crowd sensing	Urban planning	civic learning	elections	Urban mobility	Emergency and law
Points	Bianchini et al., 2016a, 2016b; Hu & Chen, 2015; Romano et al., 2016; Thiel, 2016b; Thiel & Lehner, 2015; Weerawarna et al., 2017	Bista et al., 2012, 2014; Nepal et al., 2015; Paris et al., 2018	Bousios et al., 2017; Crowley et al., 2012; Martí et al., 2012; Mulyana et al., 2015; Rakhmawati & Fibrianto, 2016; Supendi & Prihatmanto, 2015; Wei & Anwar, 2017	Olszewski et al., 2016; Opromolla, 2015; Thiel, 2016a; Thiel & Fröhlich, 2017; Thiel et al., 2016	Fernandes & Junior, 2016	Foxman & Forelle, 2014	Kazhamiakin et al., 2016, 2015; Pang et al., 2017; Poslad et al., 2015; Prandi et al., 2017	Lindley & Coulton, 2015; Romano et al., 2018
Goals, missions, to-dos, quests, tasks, challenges	Bianchini et al., 2016a, 2016b; Rehm, 2015; Romano et al., 2016; Thiel, 2016b; Thiel & Lehner, 2015; Tolmie et al., 2014; Weerawarna et al., 2017		Crowley et al., 2012; dos Santos et al., 2015; Supendi & Prihatmanto, 2015; Supriadi & Prihatmanto, 2015	Olszewski et al., 2016; Opromolla, 2015; Thiel, 2016a; Thiel & Fröhlich, 2017; Thiel et al., 2016	Fernandes & Junior, 2016	Foxman & Forelle, 2014	Kazhamiakin et al., 2016; Pang et al., 2017; Semanjski et al., 2016	Romano et al., 2018
User profiles	Bianchini et al., 2016a, 2016b; Rehm, 2015; Romano et al., 2016; Thiel, 2016b; Thiel & Lehner, 2015		Mulyana et al., 2015	Devisch et al., 2016; Thiel, 2016a; Thiel & Fröhlich, 2017; Thiel et al., 2016	Fernandes & Junior, 2016		Prandi et al., 2017; Semanjski et al., 2016	Romano et al., 2018
User rankings, levels & leaderboards	Bianchini et al., 2016a, 2016b; Hu & Chen, 2015; Romano et al., 2016; Thiel, 2016b; Thiel & Lehner, 2015; Vogiatzi et al., 2017; Weerawarna et al., 2017		Bousios et al., 2017; Crowley et al., 2012; Martí et al., 2012; Mulyana et al., 2015; Rakhmawati & Fibrianto, 2016; Wei & Anwar, 2017	Devisch et al., 2016; Thiel, 2016a; Thiel & Fröhlich, 2017; Thiel et al., 2016	Fernandes & Junior, 2016		Kazhamiakin et al., 2016, 2015; Pang et al., 2017; Semanjski et al., 2016	Lindley & Coulton, 2015; Romano et al., 2018
Rules			Supendi & Prihatmanto, 2015; Supriadi & Prihatmanto, 2015					
Achievements, badges, medals	Bianchini et al., 2016a, 2016b; Hu & Chen, 2015; Rehm, 2015; Thiel & Lehner, 2015; Vogiatzi et al., 2017; Weerawarna et al., 2017	Bista et al., 2012, 2014; Nepal et al., 2015; Paris et al., 2018	Mulyana et al., 2015; Rakhmawati & Fibrianto, 2016		Fernandes & Junior, 2016		Kazhamiakin et al., 2016, 2015	
Punishments	Hu & Chen, 2015		Bousios et al., 2017; Wei & Anwar, 2017					
Competition	Bianchini et al., 2016a, 2016b; Hu & Chen, 2015; Rehm, 2015		Bousios et al., 2017; Martí et al., 2012; Rakhmawati & Fibrianto, 2016; dos Santos et al., 2015; Susanto et al., 2017; Wei & Anwar, 2017	Devisch et al., 2016; Thiel & Fröhlich, 2017; Thiel et al., 2016			Pang et al., 2017	
Location tagging,	Rehm, 2015; Thiel, 2016b; Thiel & Lehner, 2015		Martí et al., 2012; Mulyana et al., 2015	Devisch et al., 2016; Olszewski et al., 2016; Thiel, 2016a; Thiel & Fröhlich, 2017		Foxman & Forelle, 2014	Pang et al., 2017; Prandi et al., 2017	
Time constraints	Rehm, 2015; Thiel, 2016b; Thiel & Lehner, 2015; Weerawarna et al., 2017		Crowley et al., 2012; Rakhmawati & Fibrianto, 2016; Wei & Anwar, 2017	Thiel, 2016a; Thiel & Fröhlich, 2017; Thiel et al., 2016			Pang et al., 2017	
Ideas rankings, likes & leaderboards	Bianchini et al., 2016a, 2016b; Rehm, 2015; Thiel & Lehner, 2015		Crowley et al., 2012; dos Santos et al., 2015; Susanto et al., 2017	Devisch et al., 2016; Thiel & Fröhlich, 2017			Pang et al., 2017	
Progress bars	Rehm, 2015; Thiel, 2016b; Thiel & Lehner, 2015		Martí et al., 2012; Supriadi & Prihatmanto, 2015				Semanjski et al., 2016	
Stories, characters	Tolmie et al., 2014			Devisch et al., 2016; Opromolla, 2015			Kazhamiakin et al., 2016; Prandi et al., 2017	
Notifications	Rehm, 2015		Crowley et al., 2012	Devisch et al., 2016; Olszewski et al., 2016				
Newsfeed	Rehm, 2015						Pang et al., 2017	
Avatars			Martí et al., 2012	Devisch et al., 2016				
Memes						Haleva-Amir, 2016		
Downvoting			Crowley et al., 2012					

Posting, sharing, commenting	Bianchini et al., 2016a, 2016b; Thiel & Lehner, 2015; Tolmie et al., 2014	Crowley et al., 2012; Martí et al., 2012; Mulyana et al., 2015; dos Santos et al., 2015; Susanto et al., 2017	Devisch et al., 2016; Thiel & Fröhlich, 2017		Pang et al., 2017	
Rewards, prizes, incentives		Crowley et al., 2012; Supendi & Prihatmanto, 2015; Supriadi & Prihatmanto, 2015	Olszewski et al., 2016	Foxman & Forelle, 2014	Kazhamiakin et al., 2016, 2015; Prandi et al., 2017; Sandoval-Almazan & Valle-Cruz, 2017; Semanjski et al., 2016	
Cooperation	Rehm, 2015; Thiel & Lehner, 2015	Crowley et al., 2012	Olszewski et al., 2016	Foxman & Forelle, 2014	Pang et al., 2017; Semanjski et al., 2016	
Social media	Hu & Chen, 2015; Rehm, 2015	dos Santos et al., 2015	Devisch et al., 2016	Foxman & Forelle, 2014		
Hardware						Lindley & Coulton, 2015
Reputation systems	Thiel, 2016b; Thiel & Lehner, 2015	Crowley et al., 2012	Thiel, 2016a; Thiel et al., 2016			
Feedback		Crowley et al., 2012; Supendi & Prihatmanto, 2015; Supriadi & Prihatmanto, 2015				
AR			Devisch et al., 2016		Prandi et al., 2017	
Player roles			Devisch et al., 2016; Opromolla, 2015			
Forums & chat			Devisch et al., 2016	Foxman & Forelle, 2014		
Emoticons			Thiel & Fröhlich, 2017			

Tech	E-participation level (enabling/engaging/empowering)				Policy making stage (agenda setting/analysis/creation/implementation monitoring)					
	All	Enabling	engaging	empowering	All	agenda setting	analysis	creation	implementation	monitoring
Points		Fernandes & Junior, 2016; Kazhamiakin et al., 2016, 2015; Poslad et al., 2015	Bista et al., 2012, 2014; Bousios et al., 2017; Crowley et al., 2012; Hu & Chen, 2015; Lindley & Coulton, 2015; Martí et al., 2012; Mulyana et al., 2015; Nepal et al., 2015; Olszewski et al., 2016; Pang et al., 2017; Paris et al., 2018; Prandi et al., 2017; Rakhmawati & Fibrianto, 2016; Romano et al., 2016, 2018; Supendi & Prihatmanto, 2015; Thiel, 2016a; Thiel & Fröhlich, 2017; Thiel et al., 2016; Thiel, 2016b; Thiel & Lehner, 2015; Wei & Anwar, 2017; Weerawarna et al., 2017	Bianchini et al., 2016a, 2016b; Opromolla, 2015; Thiel, 2016a, 2016b; Thiel & Fröhlich, 2017; Thiel et al., 2016	Fernandes & Junior, 2016; Hu & Chen, 2015; Opromolla, 2015; Thiel, 2016a, 2016b; Thiel et al., 2016; Thiel & Lehner, 2015;	Bianchini et al., 2016a, 2016b; Thiel & Fröhlich, 2017	Bianchini et al., 2016a, 2016b;		Bista et al., 2012, 2014; Kazhamiakin et al., 2016, 2015; Lindley & Coulton, 2015; Martí et al., 2012; Nepal et al., 2015; Pang et al., 2017; Paris et al., 2018; Poslad et al., 2015; Romano et al., 2016, 2018; Weerawarna et al., 2017	Bianchini et al., 2016a, 2016b; Bousios et al., 2017; Crowley et al., 2012; Martí et al., 2012; Mulyana et al., 2015; Prandi et al., 2017; Rakhmawati & Fibrianto, 2016; Supendi & Prihatmanto, 2015; Thiel & Fröhlich, 2017; Wei & Anwar, 2017
Goals, missions, to-dos, quests, tasks, challenges	Rehm, 2015	Fernandes & Junior, 2016; Kazhamiakin et al., 2016; Semanjski et al., 2016; Supriadi & Prihatmanto, 2015	Crowley et al., 2012; Foxman & Forelle, 2014; Olszewski et al., 2016; Pang et al., 2017; Romano et al., 2016, 2018; dos Santos et al., 2015; Supendi & Prihatmanto, 2015; Thiel, 2016a, 2016b; Thiel & Fröhlich, 2017; Thiel et al., 2016; Thiel & Lehner, 2015; Tolmie et al., 2014; Weerawarna et al., 2017	Bianchini et al., 2016a, 2016b; Opromolla, 2015; Thiel, 2016a, 2016b; Thiel & Fröhlich, 2017; Thiel et al., 2016	Fernandes & Junior, 2016; Opromolla, 2015; Rehm, 2015; Thiel, 2016a, 2016b; Thiel et al., 2016; Thiel & Lehner, 2015	Bianchini et al., 2016a, 2016b; Olszewski et al., 2016; dos Santos et al., 2015; Thiel & Fröhlich, 2017	Bianchini et al., 2016a, 2016b; Olszewski et al., 2016; dos Santos et al., 2015		Foxman & Forelle, 2014; Kazhamiakin et al., 2016; Olszewski et al., 2016; Pang et al., 2017; Romano et al., 2016, 2018; Semanjski et al., 2016; Supriadi & Prihatmanto, 2015; Tolmie et al., 2014; Weerawarna et al., 2017	Bianchini et al., 2016a, 2016b; Crowley et al., 2012; dos Santos et al., 2015; Supendi & Prihatmanto, 2015; Supriadi & Prihatmanto, 2015; Thiel & Fröhlich, 2017; Tolmie et al., 2014

User profiles	Rehm, 2015	Fernandes & Junior, 2016; Semanjski et al., 2016	Devisch et al., 2016; Mulyana et al., 2015; Prandi et al., 2017; Romano et al., 2016, 2018; Thiel, 2016a, 2016b; Thiel & Fröhlich, 2017; Thiel et al., 2016; Thiel & Lehner, 2015	Bianchini et al., 2016a, 2016b; Thiel, 2016a, 2016b; Thiel & Fröhlich, 2017; Thiel et al., 2016	Devisch et al., 2016; Fernandes & Junior, 2016; Rehm, 2015; Thiel, 2016a, 2016b; Thiel et al., 2016; Thiel & Lehner, 2015	Bianchini et al., 2016a, 2016b; Thiel & Fröhlich, 2017	Bianchini et al., 2016a, 2016b	Romano et al., 2016, 2018; Semanjski et al., 2016	Bianchini et al., 2016a, 2016b; Mulyana et al., 2015; Prandi et al., 2017; Thiel & Fröhlich, 2017
User rankings, levels & leaderboards		Fernandes & Junior, 2016; Kazhamiakin et al., 2016, 2015; Semanjski et al., 2016	Bousios et al., 2017; Crowley et al., 2012; Devisch et al., 2016; Hu & Chen, 2015; Lindley & Coulton, 2015; Martí et al., 2012; Mulyana et al., 2015; Pang et al., 2017; Rakhmawati & Fibrianto, 2016; Romano et al., 2016, 2018; Thiel, 2016a, 2016b; Thiel & Fröhlich, 2017; Thiel et al., 2016; Thiel & Lehner, 2015; Vogiatzi et al., 2017; Weerawarna et al., 2017; Wei & Anwar, 2017	Bianchini et al., 2016a, 2016b; Thiel, 2016a, 2016b; Thiel & Fröhlich, 2017; Thiel et al., 2016; Vogiatzi et al., 2017	Devisch et al., 2016; Fernandes & Junior, 2016; Hu & Chen, 2015; Thiel, 2016a, 2016b; Thiel et al., 2016; Thiel & Lehner, 2015; Vogiatzi et al., 2017	Bianchini et al., 2016a, 2016b; Thiel & Fröhlich, 2017	Bianchini et al., 2016a, 2016b	Kazhamiakin et al., 2016, 2015; Lindley & Coulton, 2015; Martí et al., 2012; Pang et al., 2017; Romano et al., 2016, 2018; Semanjski et al., 2016; Weerawarna et al., 2017	Bianchini et al., 2016a, 2016b; Bousios et al., 2017; Crowley et al., 2012; Mulyana et al., 2015; Rakhmawati & Fibrianto, 2016; Thiel & Fröhlich, 2017; Wei & Anwar, 2017
Rules		Supriadi & Prihatmanto, 2015	Supendi & Prihatmanto, 2015					Supriadi & Prihatmanto, 2015	Supendi & Prihatmanto, 2015; Supriadi & Prihatmanto, 2015
Achievements, badges, medals	Rehm, 2015	Fernandes & Junior, 2016; Kazhamiakin et al., 2016, 2015	Bista et al., 2012, 2014; Hu & Chen, 2015; Mulyana et al., 2015; Nepal et al., 2015; Paris et al., 2018; Rakhmawati & Fibrianto, 2016; Thiel & Lehner, 2015; Vogiatzi et al., 2017; Weerawarna et al., 2017	Bianchini et al., 2016a, 2016b; Vogiatzi et al., 2017	Fernandes & Junior, 2016; Hu & Chen, 2015; Rehm, 2015; Thiel & Lehner, 2015; Vogiatzi et al., 2017	Bianchini et al., 2016a, 2016b	Bianchini et al., 2016a, 2016b	Bista et al., 2012, 2014; Kazhamiakin et al., 2016, 2015; Nepal et al., 2015; Paris et al., 2018; Weerawarna et al., 2017	Bianchini et al., 2016a, 2016b; Mulyana et al., 2015; Rakhmawati & Fibrianto, 2016
Punishments			Bousios et al., 2017; Hu & Chen, 2015; Wei & Anwar, 2017		Hu & Chen, 2015				Bousios et al., 2017; Wei & Anwar, 2017
Competition	Rehm, 2015		Bousios et al., 2017; Devisch et al., 2016; Hu & Chen, 2015; Martí et al., 2012; Pang et al., 2017; Rakhmawati & Fibrianto, 2016; dos Santos et al., 2015; Susanto et al., 2017; Thiel & Fröhlich, 2017; Thiel et al., 2016; Wei & Anwar, 2017	Bianchini et al., 2016a, 2016b; Thiel & Fröhlich, 2017; Thiel et al., 2016	Devisch et al., 2016; Hu & Chen, 2015; Rehm, 2015; Susanto et al., 2017; Thiel et al., 2016	Bianchini et al., 2016a, 2016b; dos Santos et al., 2015; Thiel & Fröhlich, 2017	Bianchini et al., 2016a, 2016b; dos Santos et al., 2015	Martí et al., 2012; Pang et al., 2017	Bianchini et al., 2016a, 2016b; Bousios et al., 2017; Rakhmawati & Fibrianto, 2016; dos Santos et al., 2015; Thiel & Fröhlich, 2017; Wei & Anwar, 2017
Location tagging,	Rehm, 2015		Devisch et al., 2016; Foxman & Forelle, 2014; Martí et al., 2012; Mulyana et al., 2015; Olszewski et al., 2016; Pang et al., 2017; Prandi et al., 2017; Thiel & Fröhlich, 2017; Thiel, 2016a, 2016b; Thiel & Lehner, 2015	Thiel & Fröhlich, 2017; Thiel, 2016a, 2016b	Devisch et al., 2016; Rehm, 2015; Thiel, 2016a, 2016b; Thiel & Lehner, 2015	Olszewski et al., 2016; Thiel & Fröhlich, 2017	Olszewski et al., 2016	Foxman & Forelle, 2014; Martí et al., 2012; Olszewski et al., 2016; Pang et al., 2017	Mulyana et al., 2015; Prandi et al., 2017; Thiel & Fröhlich, 2017
Time constraints	Rehm, 2015		Crowley et al., 2012; Pang et al., 2017; Rakhmawati & Fibrianto, 2016; Thiel, 2016a, 2016b; Thiel & Fröhlich, 2017; Thiel et al., 2016; Thiel & Lehner, 2015; Weerawarna et al., 2017; Wei & Anwar, 2017	Thiel, 2016a, 2016b; Thiel & Fröhlich, 2017; Thiel et al., 2016;	Rehm, 2015; Thiel, 2016a, 2016bThiel et al., 2016; Thiel & Lehner, 2015	Thiel & Fröhlich, 2017		Pang et al., 2017; Weerawarna et al., 2017	Crowley et al., 2012; Rakhmawati & Fibrianto, 2016; Thiel & Fröhlich, 2017; Wei & Anwar, 2017
Ideas rankings, likes & leaderboards	Rehm, 2015		Crowley et al., 2012; Devisch et al., 2016; Pang et al., 2017; dos Santos et al., 2015; Susanto et al., 2017; Thiel & Fröhlich, 2017; Thiel & Lehner, 2015	Bianchini et al., 2016a, 2016b; Thiel & Fröhlich, 2017	Devisch et al., 2016; Rehm, 2015; Susanto et al., 2017; Thiel & Lehner, 2015	Bianchini et al., 2016a, 2016b; dos Santos et al., 2015; Thiel & Fröhlich, 2017	Bianchini et al., 2016a, 2016b; dos Santos et al., 2015		Bianchini et al., 2016a, 2016b; Crowley et al., 2012; dos Santos et al., 2015; Thiel & Fröhlich, 2017

Progress bars	Rehm, 2015	Semanjski et al., 2016; Supriadi & Prihatmanto, 2015	Martí et al., 2012; Thiel, 2016b; Thiel & Lehner, 2015	Thiel, 2016b	Rehm, 2015; Thiel, 2016b; Thiel & Lehner, 2015			Martí et al., 2012; Semanjski et al., 2016; Supriadi & Prihatmanto, 2015	Supriadi & Prihatmanto, 2015
Stories, characters		Kazhamiakin et al., 2016	Devisch et al., 2016; Prandi et al., 2017; Tolmie et al., 2014	Opromolla, 2015	Devisch et al., 2016; Opromolla, 2015			Kazhamiakin et al., 2016; Tolmie et al., 2014	Prandi et al., 2017; Tolmie et al., 2014
Notifications	Rehm, 2015		Crowley et al., 2012; Devisch et al., 2016; Olszewski et al., 2016		Devisch et al., 2016; Rehm, 2015	Olszewski et al., 2016	Olszewski et al., 2016	Olszewski et al., 2016	Crowley et al., 2012
Newsfeed	Rehm, 2015		Pang et al., 2017		Rehm, 2015			Pang et al., 2017	
Avatars			Devisch et al., 2016; Martí et al., 2012		Devisch et al., 2016			Martí et al., 2012	
Memes			Haleva-Amir, 2016					Haleva-Amir, 2016	
Downvoting			Crowley et al., 2012						Crowley et al., 2012
Posting, sharing, commenting			Crowley et al., 2012; Devisch et al., 2016; Martí et al., 2012; Mulyana et al., 2015; Pang et al., 2017; dos Santos et al., 2015; Susanto et al., 2017; Thiel & Fröhlich, 2017; Thiel & Lehner, 2015; Tolmie et al., 2014	Bianchini et al., 2016a, 2016b; Thiel & Fröhlich, 2017	Devisch et al., 2016; Susanto et al., 2017; Thiel & Lehner, 2015	Bianchini et al., 2016a, 2016b; Thiel & Fröhlich, 2017	Bianchini et al., 2016a, 2016b	Martí et al., 2012; Pang et al., 2017; Tolmie et al., 2014	Bianchini et al., 2016a, 2016b; Crowley et al., 2012; Mulyana et al., 2015; Thiel & Fröhlich, 2017; Tolmie et al., 2014
Rewards, prizes, incentives		Kazhamiakin et al., 2016, 2015; Semanjski et al., 2016; Supriadi & Prihatmanto, 2015	Crowley et al., 2012; Foxman & Forelle, 2014; Olszewski et al., 2016; Prandi et al., 2017; Supendi & Prihatmanto, 2015	Sandoval-Almazan & Valle-Cruz, 2017	Sandoval-Almazan & Valle-Cruz, 2017	Olszewski et al., 2016	Olszewski et al., 2016	Foxman & Forelle, 2014; Kazhamiakin et al., 2016, 2015; Olszewski et al., 2016; Semanjski et al., 2016; Supriadi & Prihatmanto, 2015	Crowley et al., 2012; Prandi et al., 2017; Supendi & Prihatmanto, 2015; Supriadi & Prihatmanto, 2015
Cooperation	Rehm, 2015	Semanjski et al., 2016	Crowley et al., 2012; Foxman & Forelle, 2014; Olszewski et al., 2016; Pang et al., 2017; Thiel & Lehner, 2015		Rehm, 2015; Thiel & Lehner, 2015	Olszewski et al., 2016	Olszewski et al., 2016	Foxman & Forelle, 2014; Olszewski et al., 2016; Pang et al., 2017; Semanjski et al., 2016	Crowley et al., 2012
Social media	Rehm, 2015		Devisch et al., 2016; Foxman & Forelle, 2014; Hu & Chen, 2015; dos Santos et al., 2015		Devisch et al., 2016; Hu & Chen, 2015; Rehm, 2015	dos Santos et al., 2015	dos Santos et al., 2015	Foxman & Forelle, 2014	dos Santos et al., 2015
Hardware			Lindley & Coulton, 2015					Lindley & Coulton, 2015	
Reputation systems			Crowley et al., 2012; Thiel, 2016a, 2016b; Thiel et al., 2016; Thiel & Lehner, 2015	Thiel, 2016a, 2016b; Thiel et al., 2016	Thiel, 2016a, 2016b; Thiel et al., 2016; Thiel & Lehner, 2015				Crowley et al., 2012
Feedback		Supriadi & Prihatmanto, 2015	Crowley et al., 2012; Supendi & Prihatmanto, 2015					Supriadi & Prihatmanto, 2015	Crowley et al., 2012; Supendi & Prihatmanto, 2015; Supriadi & Prihatmanto, 2015
AR			Devisch et al., 2016; Prandi et al., 2017		Devisch et al., 2016				Prandi et al., 2017
Player roles			Devisch et al., 2016	Opromolla, 2015	Devisch et al., 2016; Opromolla, 2015				
Forums & chat			Foxman & Forelle, 2014; Devisch et al., 2016		Devisch et al., 2016			Foxman & Forelle, 2014	
Emoticons			Thiel & Fröhlich, 2017	Thiel & Fröhlich, 2017		Thiel & Fröhlich, 2017			Thiel & Fröhlich, 2017

References

Adachi, P. J., & Willoughby, T. (2013). More than just fun and games: The longitudinal relationships between strategic video games, self- reported problem solving skills, and academic grades. *Journal of Youth and Adolescence, 42*, 1041–1052.

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review, 30*, 217–237.

Alharbi, A., Kang, K., & Hawryszkiewycz, I. (2015). The influence of trust and subjective norms on citizens' intentions to engage in e-participation on e-government websites. *Australasian Conference on Information Systems, 2011*, 1–12.

Al-Yafi, K., & El-Masri, M. (2016). Gamification of e-government services: A potential transformation gamification of e-government services: A discussion of potential transformation. *Proceedings of the 22nd Americas conference on information systems (AMCIS2016: Surfing the IT innovation wave)*.

Ampatzidou, C., Gugerell, K., Constantinescu, T., Devisch, O., Jauschneg, M., & Berger, M. (2018). All work and no play? Facilitating serious games and gamified applications in participatory urban planning and governance. *Urban Planning, 3*(1), 34–46.

Andrade, F. R., Mizoguchi, R., & Isotani, S. (2016). The bright and dark sides of gamification. *Proceedings of the International conference on intelligent tutoring systems* (pp. 176–186). Cham: Springer.

Apostolopoulos, K., Geli, M., Petrelli, P., Potsiou, C., & Ioannidis, C. (2018). A new model for cadastral surveying using crowdsourcing. *Survey Review, 50*(359), 122–133.

Arnstein, S. R. (1969). A ladder of citizen participation. *Journal of the American Planning Association, 35*(4), 216–224.

Asquer, A. (2014). Not just videogames: gamification and its potential application to public services. digital public administration and E-government. In E. F. Halpin (Ed.). *Digital public administration and E-government in developing nations: Policy and practice* (pp. 146–165). IGI Global.

Bavelier, D., Achtman, R. L., Mani, M., & Föcker, J. (2012). Neural bases of selective attention in action video game players. *Vision Research, 61*, 132–143.

Bianchini, D., Fogli, D., & Ragazzi, D. (2016a). TAB sharing: A gamified tool for e-participation. *Proceedings of the international working conference on advanced visual interfaces - AVI '16* (pp. 294–295). New York, New York, USA: ACM Press.

Bianchini, D., Fogli, D., & Ragazzi, D. (2016b). Promoting citizen participation through gamification. *Proceedings of the 9th nordic conference on human-computer interaction - NordiCHI '16* (pp. 1–4). New York, New York, USA: ACM Press.

Bingham, L. B., Nabatchi, T., & O'Leary, R. (2005). The new governance: Practices and processes for stakeholder and citizen participation in the work of government. *Public Administration Review, 65*(5), 547–558.

Bista, S. K., Nepal, S., Colineau, N., & Paris, C. (2012). Using gamification in an online community. *Proceedings of the 8th international conference on collaborative computing: networking, applications and worksharing (CollaborateCom)* (pp. 611–618). IEEE.

Bista, S. K., Nepal, S., Paris, C., & Colineau, N. (2014). Gamification for online communities: A case study for delivering government services. *International Journal of Cooperative Information Systems, 2325*(2) (1441002-1-1441002–1441025).

Blazhko, O., Luhova, T., Melnik, S., & Ruvinska, V. (2017). Communication model of open government data gamification based on Ukrainian websites. *Proceedings of the 4th experiment@international conference (exp.at'17)* (pp. 181–186). IEEE.

Bogost, I. (2014). Why gamification is bullshit. In S. P. Walz, & S. Deterding (Eds.). *The gameful world* (pp. 65–79). MIT press.

Bousios, A., Gavalas, D., & Lambrinos, L. (2017). CityCare: Crowdsourcing daily life issue reports in smart cities. *Proceedings of the 2017 IEEE symposium on computers and communications (ISCC)* (pp. 266–271). IEEE.

Brunet, L., Tuomisaari, J., Lavorel, S., Crouzat, E., Bierry, A., Peltola, T., & Arpin, I. (2018). Actionable knowledge for land use planning: Making ecosystem services operational. *Land Use Policy, 72*, 27–34.

Carreira, P., Mendes, G., Barroca, B., Amaral, V., Honkapuro, S., & Prada, R. (2017). Energy behavior engagement in smart urban environments. *Energy Procedia, 142*, 2080–2088.

Cechanowicz, J., Gutwin, C., Brownell, B., & Goodfellow, L. (2013). Effects of gamification on participation and data quality in a real-world market research domain. *Proceedings of the first international conference on gameful design, research, and applications* (pp. 58–65). .

Cernuzzi, L., & Pane, J. (2014). Toward open government in Paraguay. *IT Professional, 16*(5), 62–64.

Conge, P. J. (1988). The concept of political participation: Toward a definition. *Comparative Politics, 20*(2), 241–249.

Coronado Escobar, J. E., & Vasquez Urriago, A. R. (2014). Gamification: An effective mechanism to promote civic engagement and generate trust? *Proceedings of the 8th international conference on theory and practice of electronic governance - ICEGOV '14* (pp. 514–515). New York, New York, USA: ACM Press.

Crowley, D. N., Breslin, J. G., & Corcoran, P. (2012). Gamification of citizen sensing through mobile social reporting. *Proceedings of the 2012 IEEE international games innovation conference (IGIC)* (pp. 1–5). IEEE.

Csikszentmihalyi, M. (2000). *Beyond boredom and anxiety*. Jossey-Bass.

Deterding, S. (2012). Gamification: Designing for motivation. *Interactions, 19*(4), 14–17.

Deterding, S. (2015). The lens of intrinsic skill atoms: A method for gameful design. *Human–Computer Interaction, 30*(3–4), 294–335.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011, September). From game design elements to gamefulness: Defining gamification. *Proceedings of the 15th international academic MindTrek conference: Envisioning future media environments* (pp. 9–15). ACM.

Devisch, O., Poplin, A., & Sofronie, S. (2016). The gamification of civic participation: Two experiments in improving the skills of citizens to reflect collectively on spatial issues. *Journal of Urban Technology, 23*(2), 81–102.

de Dios Bulos, R., Delfino, N. M., & Rivera, J. P. R. (2014). Exploring data mining and gamification as tools for poverty analysis and policy formulation: A methodological framework. *Journal of Economic and Economic Education Research, 15*(3), 25–37.

dos Santos, A. C., Zambalde, A. L., Veroneze, R. B., Botelho, G. A., & de Souza Bermejo, P. H. (2015). Open innovation and social participation: A case study in public security in Brazil. *International conference on electronic government and the information systems perspective* (pp. 163–176). Cham: Springer.

Dryzek, J. S., Bächtiger, A., Chambers, S., Cohen, J., Druckman, J. N., Felicetti, A., ... Warren, M. E. (2019). The crisis of democracy and the science of deliberation. *Science, 363*(6432), 1144–1146.

Duke, R. D. (1995). Gaming: An emergent discipline. *Simulation & Gaming, 26*(4), 426–439.

Duke, R. D. (2000). A personal perspective on the evolution of gaming. *Simulation & Gaming, 31*(1), 79–85.

Duke, R. D. (2011). Origin and evolution of policy simulation: A personal journey. *Simulation & Gaming, 42*(3), 342–358.

Eränpalo, T. (2014). Exploring young People's civic identities through gamification: A case study of Finnish, Swedish and Norwegian adolescents playing a social simulation game. *Citizenship, Social and Economics Education, 13*(2), 104–120.

Ewoldsen, D. R., Eno, C. A., Okdie, B. M., Velez, J. A., Guadagno, R. E., & DeCoster, J. (2012). Effect of playing violent video games cooper- atively or competitively on subsequent cooperative behavior. *Cyber- psychology, Behavior, and Social Networking, 15*, 277–280.

Fernandes, F. T., & Junior, P. T. A. (2016). Gamification aspects in the context of electronic government and education: A case study. *Proceedings of the 3rd international conference on HCI in business, government, and organizations, HCIBGO 2016* (pp. 140–150). Toronto; Canada: Springer, Cham.

Foxman, M., & Forelle, M. (2014). Electing to play: MTV's fantasy election and changes in political engagement through gameplay. *Games and Culture, 9*(6), 454–467.

Fröding, B., & Peterson, M. (2013). Why computer games can be essential for human flourishing. *Journal of Information, Communication and Ethics in Society, 11*(2), 81–91.

Gentile, D. A., Anderson, C. A., Yukawa, S., Ihori, N., Saleem, M., Ming, L. K., ... Sakamoto, A. (2009). The effects of prosocial video games on prosocial behaviors: International evidence from correlational, lon- gitudinal, and experimental studies. *Personality and Social Psychology Bulletin, 35*, 752–763.

Geurts, J. L., Duke, R. D., & Vermeulen, P. A. (2007). Policy gaming for strategy and change. *Long Range Planning, 40*(6), 535–558.

Giangreco, E., Marasso, L., Chetta, V., Fortunato, L., & Perlangeli, C. (2014). Modeling tools of service value networks to support social innovation in a Smart City. *Innovation and the Public Sector, 21*, 206–215.

Gnat, M., Leszek, K., & Olszewski, R. (2016). The use of geoinformation technology, augmented reality and gamification in the urban modeling process. *Proceedings of the international conference on computational science and its applications* (pp. 484–496). Cham: Springer.

Gordon, E., & Baldwin-Philippi, J. (2014). Playful civic learning: Enabling reflection and lateral trust in game-based public participation. *International Journal of Communication, 8*(1), 759–786.

Granic, I., Lobel, A., & Engels, R. C. (2014). The benefits of playing video games. *American Psychologist, 69*(1), 66–78.

Green, C. S., & Bavelier, D. (2012). Learning, attentional control, and action video games. *Current Biology, 22*, 197–206.

Gurstein, M. (2003). Effective use: A community informatics strategy beyond the digital divide. *First Monday, 8*(12).

Guzman, L. I., & Clapp, A. (2017). Applying personal carbon trading: A proposed "carbon, health and savings System"for British Columbia, Canada. *Climate Policy, 17*(5), 616–633.

Haleva-Amir, S. (2016). Not all about that Facebook: Political campaigns and civic engagement in the 2015 elections. *Israel Affairs, 22*(3–4), 711–726.

Hamari, J. (2017). Do badges increase user activity? A field experiment on effects of gamification. *Computers in Human Behavior, 71*, 469–478 (Impact factor 3.435 | JUFO 2).

Hamari, J. (2019). Gamification. In G. Ritzer, & C. Rojek (Eds.). *The Blackwell Encyclopedia of sociology*. New York: John Wiley & Sons.

Hamari, J., Hassan, L., & Dias, A. (2018). Gamification, quantified-self or social networking? Matching users' goals with motivational technology. *User Modeling and User-Adapted Interaction. 28*(1).

Hamari, J., & Koivisto, J. (2015). "Working out for likes": An empirical study on social influence in exercise gamification. *Computers in Human Behavior, 50*, 333–347.

Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work?–a literature review of empirical studies on gamification. *Proceedings of the 47th Hawaii international conference onsystem sciences (HICSS)* (pp. 3025–3034). Hawaii, USA: IEEE.

Hamari, J., Sjöklint, M., & Ukkonen, A. (2016). The sharing economy: Why people participate in collaborative consumption. *Journal of the Association for Information Science and Technology, 67*(9), 2047–2059.

Hanus, M. D., & Fox, J. (2015). Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. *Computers & Education, 80*, 152–161.

Harviainen, J. T., & Hassan, L. (2019). Governmental service gamification: Central principles. *International Journal of Innovation in the Digital Economy (IJIDE), 10*(3), 1–12.

Harwood, T., & Garry, T. (2015). An investigation into gamification as a customer engagement experience environment. *Journal of Services Marketing, 29*(6/7), 533–546. https://doi.org/10.1108/JSM-01-2015-0045.

Hassan, L. (2017). Governments should play games: Towards a framework for the gamification of civic engagement platforms. *Simulation and Gaming, 48*(2), 249–267.

Hassan, L. (2018). *Means to gameful ends: How should gamification be designed?* Hanken

School of Economics.
Hassan, L., Hamari, J., & Dias, A. (2019). How motivational feedback increases user's benefits and continued use: A study on gamification, quantified-self and social networking. *International Journal of Information Management, 46*, 151–162. https://doi.org/10.1016/j.ij.
Hassan, L., Morschheuser, B., Alexan, N., & Hamari, J. (2018). First-hand experience of why gamification projects fail and what could be done about it. *Proceedings of the 2nd international GamiFIN conference, GamiFIN 2018*. CEUR-WS.
Hassan, L., Rantalainen, J., Xi, N., Pirkkalainen, H., & Hamari, J. (2020). The relationship between player types and gamification feature preferences. *Proceedings of the 4th international GamiFIN conference (GamiFIN2020), Levi, Finland*.
Hassan, L., & Thibault, M. (2020). Critical playable cities. In N. Arton (Ed.). *Making smart cities more playable. Gaming media and social effects*. Singapore: Springer.
Hassan, L., Xi, N., Gurkan, B., Koivisto, J., & Hamari, J. (2020). Gameful self-regulation: A study on how gamified self-tracking features evoke gameful experiences. *Proceedings of 53rd Hawaii international conference on system sciences (HICSS'53), Hawaii, United States, January 7–10 2020*.
Hu, S. C., & Chen, I. C. (2015, June). A gamified online forum inspiring group intelligence distillation for policy making. *International conference in swarm intelligence* (pp. 423–430). Cham: Springer.
Huotari, K., & Hamari, J. (2017). A definition for gamification: Anchoring gamification in the service marketing literature. *Electronic Markets, 27*(1), 21–31.
Hutchinson, E. (2015). Time spent online doubles in a decade - Ofcom. Retrieved February 1, 2016, from https://www.ofcom.org.uk/about-ofcom/latest/media/media-releases/2015/time-spent-online-doubles-in-a-decade.
Islam, M. S. (2008). Towards a sustainable e-participation implementation model. *European Journal of EPractice, 5*(10), 1–12.
Jackson, L. A., Witt, E. A., Games, A. I., Fitzgerald, H. E., von Eye, A., & Zhao, Y. (2012). Information technology use and creativity: Findings from the children and technology project. *Computers in Human Behavior, 28*, 370–376.
Kazhamiakin, R., Marconi, A., Martinelli, A., Pistore, M., & Valetto, G. (2016, September). A gamification framework for the long-term engagement of smart citizens. *Proceedings of the 2016 IEEE international smart cities conference (ISC2)* (pp. 1–7). IEEE.
Kazhamiakin, R., Marconi, A., Perillo, M., Pistore, M., Valetto, G., Piras, L., ... Perri, N. (2015). Using gamification to incentivize sustainable urban mobility. *Proceedings of the 2015 IEEE first international smart cities conference (ISC2)* (pp. 1–6). IEEE.
Klamert, K., & Münster, S. (2017). Child's play-a literature-based survey on gamified tools and methods for fostering public participation in urban planning. *Proceedings of the international conference on electronic participation* (pp. 24–33). Cham: Springer.
Koivisto, J., & Hamari, J. (2019). The rise of motivational information systems: A review of gamification research. *International Journal of Information Management, 45*, 191–210.
Landers, R. N., Auer, E. M., Collmus, A. B., & Armstrong, M. B. (2018). Gamification science, its history and future: Definitions and a research agenda. *Simulation & Gaming, 49*(3), 315–337.
Lee, J., & Kim, S. (2014). Active citizen e-participation in local governance: Do individual social capital and e-participation management matter? *Proceedings of 47th Hawaii international conference on system sciences (HICSS47)* (pp. 2044–2053). .
Lee-Geiller, S., & Lee, T. (2019). Using government websites to enhance democratic E-governance: A conceptual model for evaluation. *Government Information Quarterly, 36*(2), 208–225.
Lehdonvirta, V., Kässi, O., Hjorth, I., Barnard, H., & Graham, M. (2019). The global platform economy: A new offshoring institution enabling emerging-economy microproviders. *Journal of Management, 45*(2), 567–599.
Lenhart, A., Kahne, J., Middaugh, E., Macgill, A. R., Evans, C., & Vitak, J. (2008). Teens, video games, and civics: Teens' gaming experiences are diverse and include significant social interaction and civic engage- ment. *Pew Internet & American Life Project,* 1–76. Retrieved from the Pew Internet & American Life Project website http://www.pewinternet.org/Reports/2008/Teens-Video-Games-and-Civics.aspx.
Lindley, J., & Coulton, P. (2015, October). Game of drones. *Proceedings of the 2015 annual symposium on computer-human interaction in play* (pp. 613–618). ACM.
Losh, L. (2009). *Virtualpolitik: An electronic history of government media-making in a time of war, scandal, disaster, miscommunication, and mistakes.* Cambridge, MA: MIT Press.
Macintosh, A. (2004). Characterizing E-participation in policy-making. *Proceedings of the 37th Hawaii international conference on system sciences (HICSS-37)* (pp. 117–126). IEEE.
Madariaga, L., Nussbaum, M., Marañón, F., Alarcón, C., & Naranjo, M. A. (2019). User experience of government documents: A framework for informing design decisions. *Government Information Quarterly, 36*(2), 179–195.
Mahnič, N. (2014). Gamification of politics: Start a new game!. *Teorija in praksa, 51*(1).
Martí, I. G., Rodríguez, L. E., Benedito, M., Trilles, S., Beltrán, A., Díaz, L., & Huerta, J. (2012). Mobile application for noise pollution monitoring through gamification techniques. *Proceedings of the international conference on entertainment computing* (pp. 562–571). Berlin, Heidelberg: Springer.
Mayer, I. S. (2009). The gaming of policy and the politics of gaming: A review. *Simulation and Gaming, 40*(6), 825–862.
McGonigal, J. (2011). *Reality is broken: Why games make us better and how they can change the world.* New York, NY: Penguin Press.
Morschheuser, B., Hamari, J., Koivisto, J., & Maedche, A. (2017). Gamified crowdsourcing: Conceptualization, literature review, and future agenda. *International Journal of Human-Computer Studies, 106*, 26–43.
Morschheuser, B., Hamari, J., & Maedche, A. (2019). Cooperation or competition – When do people contribute more? A field experiment on gamification of crowdsourcing. *International Journal of Human-Computers Studies, 127*, 7–24.
Morschheuser, B., Hassan, L., Werder, K., & Hamari, J. (2018). How to design gamification? A method for engineering gamified software. *Information and Software Technology, 95*, 219–237.
Morschheuser, B., Maedche, A., & Walter, D. (2017). Designing cooperative gamification: Conceptualization and prototypical implementation. *Proceedings of the 2017 ACM conference on computer supported cooperative work and social computing - CSCW '17* (pp. 2410–2421). .
Mulyana, A., Hindersah, H., & Prihatmanto, A. S. (2015). Gamification design of traffic data collection through social reporting. *Proceedings of the 2015 4th international conference on interactive digital media, ICIDM 2015* (pp. 1–4). .
Münster, S., Georgi, C., Heijne, K., Klamert, K., Noennig, J. R., Pump, M., ... Van Der Meer, H. (2017). How to involve inhabitants in urban design planning by using digital tools? An overview on a state of the art, key challenges and promising approaches. *Procedia Computer Science, 112*, 2391–2405.
Nepal, S., Paris, C., & Bista, S. (2015). Gamification on the social web. In C. Paris, & D. Georgakopoulos (Eds.). *Social media for government services*. Cham: Springer.
Oceja, J., & Fernández, N. G. (2017). Classification of game experiences to promote civic competence in the context of informal learning. *Proceedings of the 11th European conference on game-based learning* (pp. 480–487). Academic Conferences International Limited.
Olszewski, R., Turek, A., & Łączyński, M. (2016). Urban gamification as a source of information for spatial data analysis and predictive participatory modelling of a City's development. *Proceedings of the 5th international conference on data management technologies and applications. SCITEPRESS*.
Opromolla, A. (2015). "Gamified" social dynamics in the interactive systems as a possible solution for increasing co-design of emerging services in smart territories. *Proceedings of the 11th international conference of the Italian SIGCHI chapter* (pp. 46–57). (CEUR workshop proceedings).
Opromolla, A., Ingrosso, A., Volpi, V., Medaglia, C. M., Palatucci, M., & Pazzola, M. (2015). Gamification in a Smart City context. An analysis and a proposal for its application in co-design processes. *Proceedings of the international conference on games and learning alliance* (pp. 73–82). .
Opromolla, A., Volpi, V., & Medaglia, C. M. (2016). Playful interactions for the Citizens' engagement. The musical language as a possible application. *Proceedings of the international conference on human-computer interaction* (pp. 71–76). Cham: Springer.
Pang, C., Pan, R., Wong, S., Neustaedter, C., & Wu, Y. (2017). City explorer: Gamifying public transit trips while exploring the City. *Proceedings of the 2017 CHI conference extended abstracts on human factors in computing systems - CHI EA '17* (pp. 2825–2832). .
Paré, G., Trudel, M.-C., Jaana, M., & Kitsiou, S. (2015). Synthesizing information systems knowledge: A typology of literature reviews. *Information & Management, 52*(2), 183–199.
Paris, C., & Nepal, S. (2015). Next Step: An online community for delivering human services. *Social media for government services* (pp. 169–196). Cham: Springer.
Paris, C., Nepal, S., & Dennett, A. (2018). A government-run online community to support recipients of welfare payments. *International Journal of Cooperative Information Systems, 27*(2), 1850001.
Pedro, L. Z., Lopes, A. M., Prates, B. G., Vassileva, J., & Isotani, S. (2015). Does gamification work for boys and girls? An exploratory study with a virtual learning environment. *Proceedings of the 30th annual ACM symposium on applied computing* (pp. 214–219). .
Phang, C. W., & Kankanhalli, A. (2008). A framework of ICT exploitation for e-participation initiatives. *Communications of the ACM, 51*(12), 128–132.
Poslad, S., Ma, A., Wang, Z., & Mei, H. (2015). Using a Smart City IoT to incentivise and target shifts in mobility behaviour—Is it a piece of pie? *Sensors, 15*(6), 13069–13096.
Prandi, C., Roccetti, M., Salomoni, P., Nisi, V., Nunes, N. J., & Tools Appl, M. (2017). Fighting exclusion: A multimedia mobile app with zombies and maps as a medium for civic engagement and design. *Multimedia Tools and Applications, 76*(4), 4951–4979.
Prensky, M. (2012). *From digital natives to digital wisdom: Hopeful essays for 21st century learning.* Thousand Oaks, CA: Corwin Press.
Raihani, N. J. (2013). Nudge politics: Efficacy and ethics. *Frontiers in Psychology, 4*, 972.
Rakhmawati, N. A., & Fibrianto, B. (2016). Designing a gamification for monitoring Surabaya City development. *Proceedings of the 2016 international conference on information & communication technology and systems (ICTS)* (pp. 262–265). IEEE.
Raphael, C., Bachen, C., Lynn, K.-M., Baldwin-Philippi, J., & McKee, K. A. (2010). Games for civic learning: A conceptual framework and agenda for research and design. *Games and Culture, 5*(2), 199–235.
Rehm, S. (2015). *DoGood: A gamified mobile app to promote civic engagement.* Doctoral dissertationLudwig-Maximilians-Universitat Munchen.
Reilhac, M. (2013). *The gamification of life.* (In the Pixel Report).
Rigby, C. S. (2015). Gamification and motivation. In S. P. Walz, & S. Deterding (Eds.). *The Gameful world: Approaches, issues, applications* (pp. 113–138). Cambridge, MA, USA: MIT Press.
Rodrigues, L. F., Costa, C. J., & Oliveira, A. (2013). The adoption of gamification in e-banking. *Proceedings of the 2013 international conference on information systems and design of communication* (pp. 47–55). .
Romano, M., Díaz, P., & Aedo, I. (2016). Emergency management and smart cities: Civic engagement through gamification. *Proceedings of the international conference on information systems for crisis response and management in mediterranean countries* (pp. 3–14). Cham: Springer.
Romano, M., Díaz, P., & Aedo, I. (2018). A gamified platform for civic engagement in early warning. *Proceedings of the XIX international conference on human computer interaction*. ACM.
Rui, A. S., Plewe, D. A., & Röcker, C. (2015). Themed passenger carriages: Promoting commuters' happiness on rapid transit systems through ambient and aesthetic intelligence. *Procedia Manufacturing, 3*, 2103–2109.
Russoniello, C. V., O'Brien, K., & Parks, J. M. (2009). EEG, HRV and psychological correlates while playing Bejeweled II: A randomized controlled study. In B. K.

Wiederhold, & G. Riva (Vol. Eds.), *Annual review of cybertherapy and telemedicine 2009: Advance technologies in the behavioral, social and neurosciences. Vol. 7. Annual review of cybertherapy and telemedicine 2009: Advance technologies in the behavioral, social and neurosciences* (pp. 189–192). Amsterdam, The Netherlands: Interactive Media Institute and IOS Press.

Ryan, R. M., Rigby, C. S., & Przybylski, A. (2006). The motivational pull of video games: A self-determination theory approach. *Motivation and Emotion, 30*, 347–363. https://doi.org/10.1007/s11031-006-9051-8.

Sæbø, Ø., Rose, J., & Skiftenes Flak, L. (2008). The shape of eParticipation: Characterizing an emerging research area. *Government Information Quarterly, 25*(3), 400–428.

Salen, K., Tekinbaş, K. S., & Zimmerman, E. (2004). *Rules of play: Game design fundamentals*. MIT press.

Sandoval-Almazan, R., & Valle-Cruz, D. (2017). Open innovation, living labs and public officials. *Proceedings of the 10th international conference on theory and practice of electronic governance - ICEGOV '17* (pp. 260–265). New York, New York, USA: ACM Press.

Semanjski, I., Lopez Aguirre, A., De Mol, J., & Gautama, S. (2016). Policy 2.0 platform for mobile sensing and incentivized targeted shifts in mobility behavior. *Sensors, 16*(7), 1035.

Sgueo, G. (2017). *Gamification, participatory democracy and engaged public (S)*. University of Vienna" Activation–Self-Management–Overload Political Participation beyond the Post-democratic Turn.

Sgueo, G. (2018). *A discussion on gamified digital advocacy. Proceedings of the international workshop on the future of law: Technology, innovation and access to justice*Berlin: Humboldt University.

Sgueo, G. (2019). *Is gamification making cities smarter?* Ius Publicum Network Review.

Shernoff, D. J., Hamari, J., & Rowe, E. (2014). Measuring flow in educational games & gamified learning environments. *Proceedings of EDMedia world conference on educational media and technology, Tampere, Finland*.

Sherry, J. L. (2004). Flow and media enjoyment. *Communication Theory, 14*, 328–347.

Steinkuehler, C., & Duncan, S. (2008). Scientific habits of mind in virtual worlds. *Journal of Science Education and Technology, 17*, 530–543.

Stenros, J. (2017). The game definition game: A review. *Games and Culture, 12*(6), 499–520.

Suiter, J. (2016). Post-truth politics. *Political Insight, 7*(3), 25–27.

Supendi, K., & Prihatmanto, A. S. (2015). Design and implementation of the assessment of public officers web base with gamification method. *Proceedings of the 2015 4th international conference on interactive digital media, ICIDM 2015* (pp. 1–6). Bandung, Indonesia: IEEE.

Supriadi, I., & Prihatmanto, A. S. (2015). Design and implementation of Indonesia united portal using crowdsourcing approach for supporting conservation and monitoring of endangered species. *Proceedings of the 4th international conference on interactive digital media (ICIDM)* (pp. 1–6). IEEE.

Susanto, T. D., Diani, M. M., & Hafidz, I. (2017). User acceptance of e-government citizen report system (a case study of city113 app). *Procedia Computer Science, 124*, 560–568.

Thaler, R. H., & Sunstein, C. R. (2003). Libertarian paternalism. *American Economic Review, 93*(2), 175–179.

Thiel, S. K. (2015). Gamified participation: Investigating the influence of game elements in civic engagement tools. *Adjunct proceedings of the 2015 ACM international joint conference on pervasive and ubiquitous computing and proceedings of the 2015 ACM international symposium on wearable computers* (pp. 527–532). New York, New York, USA: ACM Press.

Thiel, S. K. (2016a). Gamers in public participation: A boon or bane? Influence of attitudes in gamified participation platforms. *Proceedings of the 15th international conference on Mobile and ubiquitous multimedia – MUM '16* (pp. 229–240). New York, New York, USA: ACM Press.

Thiel, S. K. (2016b). Reward-based vs. social gamification: Exploring effectiveness of Gamefulness in public participation. *Proceedings of the 9th Nordic conference on human-computer interaction – NordiCHI '16* (pp. 104). New York, New York, USA: ACM Press.

Thiel, S. K. (2016c). A review of introducing game elements to e-participation. *Proceedings of the 6th international conference for E-democracy and open government, CeDEM 2016* (pp. 3–9). IEEE.

Thiel, S. K., & Fröhlich, P. (2017). Gamification as motivation to engage in location-based public participation? *Progress in location-based services 2016* (pp. 399–421). Cham: Springer.

Thiel, S. K., & Lehner, U. (2015). Exploring the effects of game elements in m-participation. *Proceedings of the 2015 British HCI conference* (pp. 65–73). ACM.

Thiel, S. K., Reisinger, M., & Röderer, K. (2016). I'm too old for this!: Influence of age on perception of gamified public participation. *Proceedings of the 15th international conference on mobile and ubiquitous multimedia - MUM '16* (pp. 343–346). New York, New York, USA: ACM Press.

Toda, A. M., Valle, P. H., & Isotani, S. (2017). The dark side of gamification: An overview of negative effects of gamification in education. *Proceedings of the researcher links workshop: higher education for all* (pp. 143–156). Cham: Springer.

Tolmie, P., Chamberlain, A., & Benford, S. (2014). Designing for reportability: Sustainable gamification, public engagement, and promoting environmental debate. *Personal and Ubiquitous Computing, 18*(7), 1763–1774.

Toots, M. (2019). Why E-participation systems fail: The case of Estonia's Osale. *Government Information Quarterly, 36*(3), 546–559.

Uttal, D. H., Meadow, N. G., Tipton, E., Hand, L. L., Alden, A. R., Warren, C., & Newcombe, N. S. (2013). The malleability of spatial skills: A meta-analysis of training studies. *Psychological Bulletin, 139*, 352–402.

Vanolo, A. (2018). Cities and the politics of gamification. *Cities, 74*, 320–326.

Ventura, M., Shute, V., & Zhao, W. (2013). The relationship between video game use and a performance-based measure of persistence. *Computers & Education, 60*, 52–58.

Vesa, M., Hamari, J., Harviainen, J. T., & Warmelink, H. (2017). Computer games and organization studies. *Organization Studies, 38*(2), 273–284.

Virkar, S. (2017). The Games people play: Exploring digital addiction within the context of the gamification of ICT project Design for Public Sector Administration Reform. In I. M. Association (Ed.). *Gaming and technology addiction: Breakthroughs in research and practice* (pp. 166–194). Hershey, PA: IGI Global.

Vogiatzi, M., Keratidis, C., Schinas, M., Diplaris, S., Yümlü, S., Forbes, P., ... Symeonidou, M. (2017). *The STEP project: Societal and political engagement of young people in environmental issues. Proceedings of the international conference on internet science*Cham: Springer148–156.

Wang, D., & Zhang, X. (2017). Fansubbing in China. Target. *International Journal of Translation Studies, 29*(2), 301–318.

Warmelink, H., Koivisto, J., Mayer, I., Vesa, M., & Hamari, J. (2018). Gamification of the work floor: A literature review of gamifying production and logistics operations. *Proceedings of the 51th annual hawaii international conference on system sciences (HICSS51). Hawaii, USA* (pp. 1108–1117). .

Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *MIS Q. 26*(2) (xiii–xxiii).

Weerawarna, N. T., Abeysiri, L., & Madhushan, A. (2017). "GAIMS" — Gamified aid information management system to connect donor and requester. *Proceedings of the 6th national conference on technology and management (NCTM)* (pp. 105–110). IEEE.

Wei, L. K., & Anwar, T. (2017). Analysis of motivation approach in mobile crowdsensing application: Specialize on public transportation domain. *Proceedings of the 6th ICT international student project conference (ICT-ISPC)* (pp. 1–4). IEEE.

Williamson, B. (2017). Decoding ClassDojo: Psycho-policy, social-emotional learning and persuasive educational technologies. *Learning, Media and Technology, 42*(4), 440–453.

Xi, N., & Hamari, J. (2019). Does gamification satisfy needs? A study on the relationship between gamification features and intrinsic need satisfaction. *International Journal of Information Management, 46*, 210–221.

Lobna Hassan (PhD) is a postdoctoral researcher at the Gamification Group, University of Turku and Tampere University, Finland. Lobna researches gamification, motivational technology, virtual reality, and e-participation. She has published in leading journals such as *International Journal of Information Management, User Modeling and User-Adapted Interaction,* and *Simulation & Gaming*.

Juho Hamari (PhD) is a Professor of Gamification and leads the Gamification Group between Tampere University, Finland and University of Turku, Finland. He has authored seminal academic studies and lead several research projects on contemporary gameful phenomenon such as gamification, esports, streaming, mixed realities, peer-to-peer economies such as sharing economies and crowdsourcing and games in general.