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The gamified museum

- A critical literature review and discussion of gamification in museums

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Abstract This paper is a discussion on the subjects in empirical studies on gamification in the non-game context of museums, based on a structured literature review. The paper examines the state of current research on the topic to determine the main subjects within the area of concern but also the gaps in existing literature. The review indicates a heightened focus on creating digital game add-ons to existing exhibitions. At the same time the review shows a lack in methods, theories and tools focused on gamification of museum exhibitions and a critical discussion about what can be qualified as gamification in the museum context. The findings of the review provide insights and directions for further studies categorised as five subjects.

Introduction

Do you remember your best museum experience? Were you a passive visitor or were you an active user in your museum experience? The museum landscape is changing and museum users are looking for experiences that are interactive and engaging in comparison to passive experiences as observing objects in glass display with their hands on their backs. This development strains the museums between their obligations as cultural institution and being experience attractions (Skot-Hansen, 2008). This means that museums need to re-evaluate their classic role as an information and knowledge institution and find ways to enhance their experience potential, but still maintain their authenticity and credibility (Skot-Hansen, 2008). So how do we shape the museum experience of the future to be both interactive and engaging as well as informative?

One way of approaching this change is by implementing gamification into the museum experience. Martens and Müller (2017) describe how game-based learning and gamification has gained a lot of interest in academia, edutainment and learning in a *Handbook of Digital Games and Entertainment Technologies* and this interest is also becoming visible within museums. The *NMC Horizon Report:*

2015 Museum Edition (Johnson, Adams Becker, Estrada, and Freeman, 2015) puts games and gamification as a trend within museum design over the next year. The report argues that museums have been using gamification as a way to increase engagement and enhance learning experiences in museums. Especially mobile games are highlighted as a way to enhance the visitor's learning experience without being a distraction (Johnson et al., 2015). In contrast Marten and Müller (2017) argue that we are still missing validation of the effect and ability of gamification to enhance motivation and learning.

Based on NMC's (Johnson, et al., 2015) forecast of gamification being trending within the museum context in 2016 and forth as well as Martens and Müllers' (2017) critique of missing validation of the effect of gamification, the focus in this paper is research done within gamification in the non-game context of museums. More specifically, this literature review will explore how gamification has been applied within the museum context in the last 10 years? And what can we say and learn based on this research? Even though NMC's (Johnson, et al., 2015) forecast of both games and gamification as trending in museums, this literature review focus on gamification and not games in its search. The interest of the literature review is to get an overview of research focused on implementing gamification into the museum exhibitions and not to look at games added to museums. This means that the literature review might miss some aspects of gamification but also opens up the opportunity for further research.

Positioning the understanding of gamification

The common idea of *gamification* is the introduction of game design elements into either a non-game context or system with the main goal to improve user experience and user engagement (Deterding, Sicart, Nacke, O'Hara and Dixon, 2011a; Deterding, Dixon, Khaled and Nacke, 2011b). Since *gamification* started to get its widespread adoption in the second half of 2010 (Deterding et al., 2011a), it has been contested as a research term that game and user experience designers challenge with other terms like *gamefulness* and *gameful design* (Matallaoui, Hanner and Zarnekow, 2017). There have been different definitions of gamification since Deterding et. al.'s definition of the term in 2011. The most recent examples are in the anthology *Gamification - using game elements in serious contexts* (Matallaoui et al., 2017) and the chapter *Gamification* in *Handbook of Digital Games and Entertainment Technologies* (Martens and Müller, 2017). Matallaoui et al. (2017) describe gamification as being distinguished from serious games and game design as it only partly uses game elements but is still rule-based and goal-oriented. Martens and Müller (2017) describe gamification as being closely related to game-based learning and game playing acknowledging that separating the traditions from one another can be a bit blurry. Martens

et al.'s (2017) and Matallaoui et al.'s (2017) definitions of gamification are basically not that different from Deterding et al.'s (2011a) description being the introduction of game design elements in non-game context. But Martens et al. (2017) and Matallaoui et al. (2017) elaborate on the application domains and pseudoknowledge of gamification. Nevertheless, Martens and Müller (2017) are somewhat critical about the effect and ability of gamification to enhance motivation, participation and learning because of the missing data to validate this effect (Martens and Müller, 2017). This paper does not aim to add another definition of gamification to research but instead examines the research within gamification in the context of museums and I will therefore approach this research paper with the broader understanding of gamification being the introduction of game design elements in non-game context (Deterding et al., 2011a).

The paper consists of five sections, starting with *methodology*, followed by *research areas within gamification in museums* which became visible through the literature review. Based on these research areas the next section focuses *on situating the subjects of The Gamified Museum*. This results in a section on possible *further studies* before wrapping up the paper with the *conclusion*.

Methodology

The method used in this study is desk research in form of a structured literature search and review. This section will explain the search strategy including choice of databases, keywords, delimiting factors, and the result of the literature search.

Database // Five databases were chosen for the search, *Taylor & Francis Online, Springerlink, ACM digital library*, *IEEE Xplore* and *Google Scholar*. Taylor and Francis was chosen because of their multiple journals covering museums and cultural heritages. Springerlink has a broad variation of publications, among others a couple of book publications from 2017 about gamification. ACM and IEEE were chosen because of their focus on research within HCI. Lastly, Google Scholar was chosen as a supplement to look for references within the chosen publications from the other databases.

Keywords // The search strategy had two main search terms; gamification and museum. For each term, there were found synonyms in one of the database thesauruses were found to broaden the search outcome. A couple of test searches were conducted before formulating the final search string: *gaming OR gam * OR play * OR "serious games" OR "game mechanic *" AND museum OR museology OR "museum studies" OR "cultural heritage" OR culture OR "culture institution" OR exhibition OR heritage.*

Delimiting factors // The search was further narrowed by focusing on peer-review research publications and searching for research published between 2007-2017.

Results // This search strategy resulted in 1.381 publications across the databases. Titles and abstracts of the 1.381 publications were read to identify relevant research papers addressing gamification in a museum context. The process had the purpose of identifying the scope of the different publications and whether or not they fulfilled the search criteria. Therefore, if the publication did not contain any mention of gamification and museums, the main term or the synonyms, or did not seem relevant by its focus to gamification in some kind of cultural context, they were cut from the relevant literature. This initial reading process reduced the publication pile to 64 publications. Next step was to read the full-text of the identified 64 publications that seemed within the scope of this literature review. The delimiting process here was the same as before, except for the fact that it was now based upon whether or not the publication as a whole was relevant and within the scope of the literature review. Reading the full-text of the 64 publications reduced the number of relevant publications to 26.

With the search complete, the 26 chosen publications were thoroughly re-read and organised in a table to visualise the subjects addressed in each publication (see Table 1). Table 1 creates an overview of the publications' subjects so that I can define the main subjects with the area of concern. The subjects are written into the table as they appeared in the text when reading through the publications. This process was an open categorization of the subjects based on either how gamification was applied, what kind of game-elements were used, technologies or other relevant or significant subjects appeared in the publication. This means that none of the subjects are pre-written into the table but developed throughout the literature review. Using this method has the advantage that when a new subject appeared, the previously read publications were revisited to see if they also mentioned these subjects.

When all 26 research publications were re-read and placed in the table, it became clear which publications have actually researched gamification in the museum context. If we take a look at the table (Table 1), there are 8 publications marked with green which are the most relevant publications that focus on gamification in museums. Whereas the other 18 publications in table 1 are interesting and do mention museums and gamification, their main research area is not in the combination of gamification in museums context. This does not make them irrelevant to discuss but these are not within the core of the literature review and therefore not all of them will be part of the literature

review. It is important to stress that the main focus in this literature review was to get an overview of research within gamification and museums, be it wide or narrow.

Table 1: The table includes Author(s), Year, Title, Conference/Journal, Database and the 21 subjects identified from the

Author(s)	Year	Title	Conference / Journal	Database	Gamification Background	Gamification	Game-based learning (GBL)	Museum	History	Digital game	Cultural heritage	Experience	Edutainment	Trends in technology	Learning	Technology	AR	Motivation	Gamified learning	Serious Game	Gameful design method	Play	Virtual world	Smartphone app	Online game
Afand, A. S. T., Hindersah, H., & Wuryandari, A. I.	2014	Design and implementation of turn-based strategy (TBS) game as part of service-based alternate reality game (ARG)	System Engineering and Technology (ICSET)	IEEE		1	1	1		1	1	1			1	1		1	1	1					
Aydin, S., & Schnabel, M. A	2016	The Museum of Gamers: Unmediated Cultural Heritage Through Gaming.	Cultural Heritage in a Changing World (pp. 125-141). Springer International Publishing.	Springerlink		1		1	1	1	1	1				1		1	1						
Champion, E. M.	2008	Otherness of Place: Game-based Interaction and Learning in Virtual Heritage Projects	International Journal of Heritage Studies	Taylor & Francis			1	1		1					1	1		1							
Coenen, T., Mostmans, L., & Naessens, K.	2013	MuseUs: Case study of a pervasive cultural heritage serious game	Journal on Computing and Cultural Heritage (JOCCH), 6(2), 8.	ACM		1	1	1		1			1		1	1		1		1				1	
Deterding	2015	The lens of intrinsic skill atoms: A method for gameful design	Human–Computer Interaction, 30(3-4), 294-335.	Taylor & Francis	1	1								1	1			1			1				
Deterding	2014	The ambiguity of games: Histories and discourses of a gameful world.	To appear in: Walz, Steffen P. & Sebastian Deterding (eds.): The Gameful World. Approaches, Issues, Applications. Cambridge, MA: MIT Press.	Google Scholar	1				1									1			1				
Deterding, S., Sicart, M., Nacke, L., O'Hara, K., & Dixon, D	2011	Gamification. using game-design elements in non-gaming contexts	CHI'11 Extended Abstracts on Human Factors in Computing Systems	ACM		1	1	1	1	1		1				1		1							
Eleftheria, C. A., Charikleia, P., Iason, C. G., Athanasios, T., & Dimitrios, T.	2013	An Innovative Augmented Reality Educational Platform Using Gamification to Enhance Lifelong Learning and Cultural Education	Information, Intelligence, Systems and Applications (IISA)	IEEE		1	1				1				1	1	1		1						
Frasca, R., Mazzeo, A., Pantile, D., Ventrella, M., & Verreschi, G.	2015	Innovative systems for the enjoyment of pictorial works the experience of Gallerie dell'Accademia Museum in Venice.	2015 Digital Heritage	IEEE		1		1		1	1	1			1	1	1								
Froschauer, J., Merkl, D., Arends, M., and Goldfarb, D.	2013	Art history concepts at play with ThIATRO.	ACM J. Comput. Cult.	ACM		1	1	1	1	1					1			1		1	1				1
Haake, S.	2015	New memory spaces for cultural history	2015 Digital Heritage (Vol. 1, pp. 417-418)	IEEE		1	1	1	1	1	1					1	1	1	1						
Hamari, J., Koivisto, J., and Sarsa, H.	2014	Does gamification work? a literature review of empirical studies on gamification	47th Hawaii International Conference on System Sciences	IEEE	1	1																			
Hernández Ibáñez, L. A., & Barneche Naya, V.	2012	Joint spaces between schools and museums via virtual worlds: a case study	Proceedings of the 2012 ACM workshop on User experience in e-learning and augmented technologies in education	ACM		1	1	1	1		1				1	1		1			1	1	1		
Hertzman, E., Anderson, D., & Rowley, S.	2008	Edutainment heritage tourist attractions: a portrait of visitors' experiences at Storyeum	Museum Management and Curatorship	Taylor & Francis			1	1		1	1	1	1		1			1	1						
Johnson, L., Adams Becker, S., Estrada, V., and F	2015	Games and Gamification	NMC Horizon Report: 2015 Museum Edition	Google Scholar	1	1	1	1		1	1			1	1			1		1					
Kontogianni, G., & Georgopoulos	2015	A Realistic Gamification Attempt for the Ancient Agora of Athens	2015 Digital Heritage (Vol. 1, pp. 377-380)	IEEE		1	1	1		1	1			1	1		1	1							
Marache-Francisco, C. & Brangier, E.	2015	The Gamification experience - UXD with a Gamification background	Gamification: Concepts, Methodologies, Tools, and Applications	Google Scholar	1	1								1	1		1	1			1				
Martens, A., and Müller, W.	2017	Gamification	Handbook of Digital Games and Entertainment Technologies.	Springer	1	1																			
Matallaoui, A., Hanner, N., and Zarnekow, R.	2017	Introduction to Gamification: Foundation and Underlying Theories.	In the Book "Gamification" by Springer International Publishing	Springer	1	1			1									1							
Metzger, S.A., & Paxton, R.J.	2016	Gaming History: A Framework for What Video Games Teach About the Past	Theory & Research in Social Education	Taylor & Francis		1	1		1	1					1	1		1	1						
Nicholson, S.	2012	Strategies for meaningful gamification: Concepts behind transformative play and participatory museums	Presented at Meaningful Play 2012. Lansing, Michigan	Scholar		1	1	1			1	1	1		1	1		1	1			1			
Prakash, E. C., & Rao, M.	2015	Gamification in Informal Education Environments: A Case Study	Transforming Learning and IT Management through Gamification (pp. 73-97). Springer International Publishing.	Springerlink		1	1	1	1	1					1	1		1		1					
Rubino, I., Barberis, C., Xhembulla, J., and Malnati, G.	2015	Integrating a Location-Based Mobile Game in the Museum Visit: Evaluating Visitors' Behaviour and Learning	ACM Journal on Computing and Cultural Heritage	ACM		1	1	1	1	1	1	1			1	1		1						1	
San Chee, Y.	2015	Games-to-teach Or Games-to-learn: Unlocking the Power of Digital Game-based Learning Through Performance		Springer		1	1		1	1					1			1							
Shih, J.L., Jheng, S.C., & Tseng, J.J.	2015	A simulated learning environment of history games for enhancing players' cultural awareness	Interactive Learning Environments	Taylor & Francis		1	1	1	1	1	1		1		1	1		1							
Uskov, A., & Sekar, B.	2015	Chapter 2: Smart gamification and smart serious games	In Fusion of Smart, Multimedia and Computer Gaming Technologies (pp. 7-36). Springer International Publishing.	Springerlink	1	1	1			1				1	1			1		1					
Results					9	19	17	10	9	11	6	7	3	3	16	12	3	19	5	3	4	1	1	1	1

publications. The 26 publications are structured according to alphabetic order. A 1 is placed in the publication row under subjects relevant to the research. At the bottom of the table, the total of publications mentioning the different subjects are counted; as an example, 17 publications write about Game-based-Learning. Lastly, the 8 green publications are the ones focusing on gamification in a museum context.

Research Areas within Gamification in Museums

Based on the above mentioned structured literature review (table 1), this next part focuses on identifying the main subject represented in the current research within gamification in the museum context. This part is divided into five headings; the first is *theoretical gamification*, where we start with general theoretical literature within gamification and then move on to specific theoretical literature within the area of concern. This leads to *motivation, add-on-games* and *game-based-learning* and, lastly, *situating "the gamifies museum"* that sum up the main themes and subjects represented in the current research within the area of concern. As mentioned in the previous part, the research of 8 main publications is focused on gamification in the museums context. Therefore, these 8 will be dominant in the following discussion but supported by the other 15 publications when relevant.

Theoretical Gamification // There has been a steady increase in academic research within gamification since 2010 (Hamari, Koivisto and Sarsa, 2014) when the term saw its widespread adoption (Deterding et al., 2011a). Within the last three years, four books on gamification have been published, based on the structured literature review. This might not be a complete list, but these are the books identified through the literature search. In 2014, Baek and Marsh published an anthology about the trends and applications of serious gaming and social media. Walz and Deterding (2015) set out to examine the key challenges of gamification and the ludification of culture in the anthology *The Gameful World*. San Chee took a closer look at gamification in a learning perspective in 2016 with *Games-to-teach or Games-to-learn: Unlocking the Power of Digital Game-based Learning Through Performance*. Lastly, Springer published the *Handbook of digital games and entertainment technologies* where Martens and Müller (2017) contributed with a chapter focusing on gamification.

When restricting the search to only entail academic peer-reviewed research about gamification in a museums context, the first relevant publications are dated 2012 and the number of publications increased through 2015. This supports NMC Horizon Report's (Johnson et al., 2015) notion to predict gamification as being the time-to-adopt trend in museums from 2016. At the same time, however, Baek and Marsh (2014), Walz and Deterding (2015), San Chee (2016) and Martens and Müller's (2017) publications on gamification do not include the perspective of gamification in the

museum context. Baek and Marsh (2014) mention museums in a discussion about using games as a way to let people visit museums that are out of their economical, graphical or physical reach. Walz and Deterding (2015) mention gamification in museum installations as an example of the rhetoric use of pleasure in designing user experiences. Martens and Müller (2017) refer to the New York Museum of Modern Art as an example of using gamification to gamify school kids' learning opportunities. And lastly, the publication by San Chee (2016) does not share any examples or use of gamification in the museum context.

The gamification-focused publications indicate a lack in the research about gamification in the museum contexts. In the literature search, a publication by Nicholson (2012) was found. Nicholson (2012) researches strategies and concepts for meaningful gamification behind transformative play and participatory museums. He describes museums and other leisure settings like libraries and zoos as having potential as Ludic Learning Spaces for meaningful gamification. This is not a method but rather a strategy for working with gamification in the museum context Nicholson (2012) focuses on *Meaningful Gamification* which is centred around adding an overlay of play elements to a real-life setting as explained in this quote:

> "The designers of a ludic learning space combine play opportunities along with limits to create a space where participants can choose to enter, leave themselves behind, and engage with play. If opportunities are created, participants can explore this space, discover what is meaningful, engage, reflect, and allow themselves to be transformed." (Nicholson, 2012 p.6)

Important to note here is that Nicholson (2012) approach to gamification is based on play and ludos rather than games, and he therefore argues for replacing some of the basic game structures like external rewards and badges with engaging play. Nicholson (2012) describes that the purpose of meaningful gamification is to create playful information-based spaces that allow visitors to play by exploring on their own terms and because of their internal motivation.

Motivation // Motivation is a key element in gamification as showed by the focus on motivation in one of the underlying definitions (Matallaoui, Hanner and Zarnekow, 2017). Motivation is based in psychology meaning to be moved to do something, being energized or activated to an end (Ryan, and Deci, 2000). Motivation is classically divided into intrinsic and extrinsic motivation (Ryan and Deci, 2000). In gamification, Nicholson (2012) describes this differentiation as Meaningful and BLAP gamification (BLAP being an abbreviation of Badges Levels and Leaderboards,

Achievements, and Points). Meaningful gamification is based on intrinsic motivation because it focuses on the user's internal motivation and opportunity to play by exploring on their own terms as described above. This stands in contrast to extrinsic motivation, which Nicholson (2012) describes as being connected to BLAP gamification. BLAP is described as the overlay of points, levels, achievements, and badges to real-life settings, focusing on goals, structure and external rewards to motivate the visitor. This type of gamification is based on the user's extrinsic motivation. This is both an interesting understanding of the division of both gamification and motivation. Nevertheless, this is also a very limited understanding of something as fluid as motivation. Extrinsic motivation can be present in play, as well as intrinsic motivation can be present in games depending of the context and the format of a game, play or the gamer or player. The research papers identified in this literature review varies in mentioning motivation. The studies by Rubini Barberis, Xhembulla and Malnati (2015) and Afand, Hindersah and Wuryandari's (2014) describe wanting to use gamification as a mean for user motivation, but do not distinguish between extrinsic or intrinsic. Whereas Prakash and Rao (2015), Fransca et al. (2015), Konogianni and Georgopoulos (2015) and Hernández Ibáñez and Barneche Naya (2012) do not deal with motivation in their use of gamification.

Add-on Games // The majority of publications found in this study writes about gamification in museums in connection with games added on to the existing museum experience, arguing to motivate users in informal environments by creating a game that is added onto the museum experience. Rubino, Barberis, Xhembulla and Malnati's (2015) study on location-based mobile game in the museum visit capitalize narrative and game mechanics as being the prime factors in fostering young visitors' motivation to explore a museum and facilitate their meaning-making process. Their game-based-learning approach to gamifying the museum is focused on creating a game to add to the museum experience with the aim of fostering motivation by creating tasks and rewards in the storyline of the game (Rubini et al., 2015). Afand, Hindersah and Wuryandari's (2014) study on the mobile alternate reality game Popo, uses motivation as a nudge to attract visitors to a museum. This is as Rubini et al. (2015) a game added on to an existing experience. Both the studies by Rubino et al. (2015) and Afand et al. (2014) revolve around the creation of mobile games with the purpose of gamifying the museum experience. Four additional studies, Prakash and Rao (2015), Fransca et al. (2015), Konogianni and Georgopoulos (2015) and Hernández Ibáñez and Barneche Naya (2012), represent add-on games for a museum context and identify their game concept as being gamification.

Game-Based-Learning // Konogianni and Georgopoulos (2015) created a serious game about the ancient Agora in Athens. Konogianni and Georgopoulos' (2015) research is based on an online desktop-based game on 3D models of monuments and a quiz. The purpose of the quiz is for the users to be able to gain simple knowledge about the cultural heritage of the monuments. Konogianni and Georgopoulos (2015) do not elaborate on what game elements they have used or why they argue that a quiz is a serious game or how this game will motivate their users. Their main subject in this publication is a serious game that can communicate knowledge making the purpose of the project game-based-learning. They make a worthy remark in the introduction describing serious games and gamification as being equivalent. This, I will get back to.

Furthermore, Fransca, Mazzeo, Pantile, Ventrella and Verreschi (2015) have created an Augmented Reality (AR) and game-based app for Gallerie dell'Accademia Museum in Venice, Italy, to enrich and create an immersive user experience. Gamification is a keyword in their publication, and they conclude that they have created the opportunity for learning through gaming by adding the AR and game-based app to the exhibition. Fransca et al. (2015) do not go into details about the game elements they have focused on in their app and discuss the motivational level of their game. What sets Fransca et al.'s (2015) study apart from the others mentioned in this paper is that their AR and game-based app is developed as part of a larger multimedia initiative (mostly screens and videos) in the museum.

Prakash and Rao (2015) have made a case study on gamification in informal education environments. In this study, they wanted to test the application of virtual reality, mixed reality, video games and their interactive capabilities to gamify the museum or cultural heritage experience. They have created and tested two different web-based video games that are not site-specific (Prakash and Rao, 2015). The publication focuses on describing the video games and the game mechanics and development, which comes down to narratives, learning opportunities and the virtual spaces. Nevertheless, they conclude that they, through the study, missed methodologies and tools for efficient production of gamification and serious games. Their study did not comment on user motivation or how games can be implemented in an exhibition, which makes this another example of an add-on game.

Hernández Ibáñez and Barneche Naya (2012) presents an evaluation of a game that joins the space between schools and museums through a virtual online quest. Hernández Ibáñez and Barneche Naya (2012) refer to gamification in analysing the learning aspect of their game to argue that the users of the game were having an enjoyable experience based on the motivation, means and mechanics of

gamification implemented in the game. They do not elaborate on this aspect but conclude that the playful approach of the game permits the users to acquire knowledge.

Prakash and Rao (2015), Fransca et al. (2015), Konogianni and Georgopoulos (2015) and Hernández Ibáñez and Barneche Naya's (2012) studies have a common factor: except from being examples of add-on games to a museum context, they focus on game-based learning which was also the most mentioned subject in table 1 with 17 out of 26 articles having mentioned this subject.

Situating the subjects of "The Gamified Museum"

Based on the presentation and discussion of the subjects from the literature review presented above, there are four main subjects in this study. One of them is *add-on games* which shows that, up until now, research within gamification in museums has been conducted by adding a game onto an existing exhibition through some kind of digital technology. This section of the paper will discuss how we can situate the subject of gamification in museums based on the research areas identified in the previous section.

The majority of publications in this study represent either a case or example of an add-on game. This means that none of these studies research implementing gamification into the museum exhibition design but rather create a game to add to an existing exhibition in an attempt to enhance the learning experience. This raises a question, because can we call this gamification? As previously stated, gamification is, in its simple form, the integration of gaming elements and mechanics into a non-game situation or context for motivational purpose. So adding a digital mobile game to an existing exhibition: is that gamification? Or is it rather a game that supports the learning potential in the exhibition design? This is a point that Deterding et al. (2011b) emphasize:

> "Another important point is the high level of subjectivity and contextuality in identifying "gamification". It is not possible to determine whether a given empirical system 'is' "a gamified application" or "a game" without taking recourse to either the designers' intentions or the user experiences and enactments."
> (Deterding et al., 2011b, p14)

Even though most of the research represented in this literature review cannot be directly identified as gamification that does not mean that it is not. Rather, since the researchers who designed the add-on concepts describes their research as gamification, it will be qualified as such. This might be a

nuance of gamification that needs to be further discussed, especially considering that games and gamification are trending in museums (Johnson, et al., 2015).

Furthermore, in most of the research relevant to this study, gamification has been mentioned alongside learning, education, training and as basis for game-based-learning. But does the purpose of gamification have to be learning, when applied in museums? Nicholson (2012) focuses on meaningful gamification along with ludic learning spaces but he also describes meaningful gamification as creating a space where participants can explore this space, engage with play, discover what is meaningful to them and reflect on their own experience to be transformed. This does not mean that meaningful gamification has to be a learning experience or a ludic-learning-space but rather a space to experience.

On the other hand, Martens and Müller (2017) distance gamification from learning and refer to the area where gamification and edutainment cross paths. They argue that gamification is not instructional at its core but it should be fun whereas if the purpose of applying game elements becomes educational, we would be talking about serious games (Martens and Müller, 2017). Martens and Müller (2017) distinction between the different traditions can be seen in figure1:
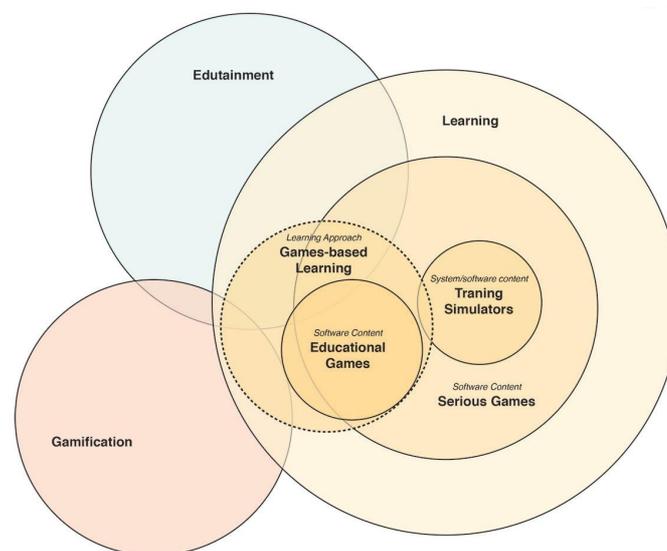

Figure 1: Relation between game-based-learning, gamification
and edutainment (after Martens and Müller, 2017).

What is interesting about this illustration compared to this study is the relationship between game-based-learning and gamification. The vast majority of research presented in this paper writes about game-based-learning, and game-based-learning in connection to gamification. This means that a great deal of the research within gamification in the museum context is placed in the area overlapping gamification and game-based-learning. Whereas only a few studies write about serious

games and gamification as being one and the same, which is improper if follow Martens and Müller's (2017) argumentation, since serious games and gamification have no shared area between them (figure 1).

Another main subject that can distinguish the different design traditions from each other is *motivation*. Motivation was the most mentioned subject in the literature review. Motivation is often mentioned in connection to the user experience or user interaction. A few of the publications like Afand et al. (2014) also write about the distinction between intrinsic and extrinsic motivation and how the users can go from extrinsic to intrinsic through their game. Most significant was Nicholson (2012) who embraces the main area of concern of this study with his publication on strategies and concepts to create exhibition designs in a participatory museum based on meaningful gamification. Like mentioned in the section *motivation*, Nicholson (2012) sets intrinsic motivation as the main user motivation in meaningful gamification.

The figure and the relation between the design traditions can be discussed depending on the project or research at hand, maybe a concept will be able to create new connections. Nevertheless, the figure visualize this rather complex area as well as the relation between them. Based on the studies presented in this literature review, an illustration of this kind is needed. More of the studies show signs of confusion about gamification and the relation of the term to other areas such as serious games, games and game-based-learning. As well as the relationship or differences between games and play/ludos.

Further Studies in The Gamified Museum

In this section I will suggest and discuss potentials for further research and implementation of gamification in museum. This study has identified four main subjects within the research of gamification in the museum context: *add-on games, game-based-learning, motivation and lack of methods and theories.* With games and gamification trending in museums (Johnson et al., 2015), these main subjects represent at least five areas of interest for further research to understand the effects and abilities of gamification (Martens and Müller, 2017) in the museum context.

Critical discussion // First of all it would be interesting to conduct a critical analysis and discussion on whether a game that has been added onto an existing exhibition in an attempt to enhance the learning experience can be called gamification, as had been suggested in most of the research presented under the subject *add-on games*. As mentioned earlier, the majority of studies in this study presents add-on games as the means to gamifying the museum experience (*Add-on Games*).

The distinction between games and gamification seems to be fluent in the different studies, and a critical discussion on this distinction between the two is important for designer or museum professional who wants to or are trying to implement gamification in their museum designs. Even though Deterding et al. (2011b) states that it is impossible to determine whether a system has been gamified without taking recourse to the designers' intentions, it is important to understand the difference between using gamification in exhibition design or create a game experience, whether it is an add-on game or a implemented part of the exhibition.

Literature review on Games in Museums // In continuation of the discussion about add-on games, a literature review on games in museums could potentially be valuable. This literature review "The Gamified Museum" has not searched for games in museums but rather gamification in the museum. Based on the representation of games in the literature review and the NMC report (Johnson et al., 2015), a tendency to introduce games to the museum context exists. Therefore, it is to be expected that more publications available for analysis can be found. So a literature review on and discussion about games in a museum context and the effect of those games will also be a relevant contribution to gamification as a research area.

Gamification = game-based-learning? // From the identification of research areas within gamification in museums a vast majority of studies defined game-based-learning as gamification in a museums context. However, when reviewing the illustration by Martens and Müller (2017)(figure 1), only a small area of gamification overlap with game-based-learning. This contradiction indicates that there is potential for a more elaborate discussion on whether gamification is equivalent to game-based-learning. It is interesting whether or not games can be used as a mean to enhance leaning potential, but the notion that gamification and game-based-learning are equivalent to each other might be a misconception. Maybe what we can say is that game-based-learning is a way of gamifying the learning experience, but does a gamified experience has to be a learning experience?

Effect of gamification in museums // As pointed out in the introduction, Martens and Müller (2017) point to a lack of validation of the effect and ability of gamification to enhance motivation and learning. Since a majority of the studies in this literature review writes about motivation and learning in connection to gamification or games, there is a need to establish a study or literature review researching the effects of gamification and games in non-game contexts. The studies referred to in this paper all focus on how to create a gamified experience with a specific goal, such as learning or the like, but none of them focuses on the effect of using games or gamification in

comparison to regular methods of communicating, learning or experiencing. It would therefore be interesting to collect or research the potential effect of using gamification or games.

Framework // Lastly, the literature review made it clear that there is a lack of methods, frameworks or theories within gamification and the museum context. With only one publication focusing on strategies to create meaningful gamification in participatory museums, Nicholson (2012) presents the initial ideas for a framework. Apart from Nicholson (2012), this literature review has identified and been referring to general theories on gamification presented by Martens and Müller (2017), Baek and Marsh (2014), Walz and Deterding (2015), Deterding et al. (2011a; 2011b) and San Chee (2016). Therefore, it would be interesting to elaborate on Nicholson's (2012) publication on meaningful gamification in an attempt to define a framework of gamification in a museum context or discuss whether or not there are any difference between general gamification theory and applying gamification in museums.

Conclusion

This study has shown that gamification and games are already being used in museum contexts to create more interactive and engaging experiences, and thereby are part of shaping the museum experiences of the future. But there are still some challenges in understanding the possibilities and use of gamification and games in museum experiences as well as the effect of applying these approaches. As well as distinguishing the differences between concepts such as gamification, games and game-based learning. But what have we learnt from this study? There is an increase in studies within gamification in the museum context from 2015, which reflects the prediction of NMC (Johnson, 2015) of games and gamification trending in museums. Based on the research presented in this study, we can point to three main trends in research of gamification in museums context. *Game-based-learning*, *add-on games* and *motivation*. Looking at the examples of research in gamification in museums contexts, it becomes clear that up until now gamification has been researched by adding a game onto an existing exhibition through some kind of digital technology. There are no studies that research the implementation of gamification into an exhibition design and thereby create a holistic exhibition rather than an add-on game to an existing exhibition. This does not mean that no museums have actually gamified their exhibition design, but rather that research has not been done on the effect of this. This tendency raises the question of whether or not games can contribute something that gamification cannot. With gamification being a rather new design tradition in connection with museums, it can be argued that the easiest way to research how game-elements could be applied to a museum context is by adding a game to an existing exhibition rather than re-designing an exhibition based on gamification.

Moreover, gamification research in general points to a lack in evidence of the effect and ability of gamification to enhance learning and motivation, which needs to be further researched. At the same time, however, the relevant studies to this paper show a tendency to view gamification as being equal to game-based-learning. This might not be an inaccurate assumption in some cases but if we focus on the definition of the two traditions they are different approaches. This indicates a need for further discussion or research on this matter to understand the differences between the traditions and the purpose of either one. At the same time, it could also indicate a need for a framework for working with gamification in museums (or in general) that differentiates different design traditions and their purposes. In the last couple of years, quite a selection of books on gamification have been published. What is interesting about them in regards to this paper is the lack of focus on the museum context, which also refers to the earlier mentioned lack of methods or frameworks for gamifying a museum. It can, therefore, be argued that the gamified museum is still at its beginning stages, and many application possibilities and studies can be further explored in the future.

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