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Gamification in theory and action: A survey ☆

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ABSTRACT

Gamification has drawn the attention of academics, practitioners and business professionals in domains as diverse as education, information studies, human–computer interaction, and health. As yet, the term remains mired in diverse meanings and contradictory uses, while the concept faces division on its academic worth, underdeveloped theoretical foundations, and a dearth of standardized guidelines for application. Despite widespread commentary on its merits and shortcomings, little empirical work has sought to validate gamification as a meaningful concept and provide evidence of its effectiveness as a tool for motivating and engaging users in non-entertainment contexts. Moreover, no work to date has surveyed gamification as a field of study from a human–computer studies perspective. In this paper, we present a systematic survey on the use of gamification in published theoretical reviews and research papers involving interactive systems and human participants. We outline current theoretical understandings of gamification and draw comparisons to related approaches, including alternate reality games (ARGs), games with a purpose (GWAPs), and gameful design. We present a multidisciplinary review of gamification in action, focusing on empirical findings related to purpose and context, design of systems, approaches and techniques, and user impact. Findings from the survey show that a standard conceptualization of gamification is emerging against a growing backdrop of empirical participants-based research. However, definitional subjectivity, diverse or unstated theoretical foundations, incongruities among empirical findings, and inadequate experimental design remain matters of concern. We discuss how gamification may to be more usefully presented as a subset of a larger effort to improve the user experience of interactive systems through gameful design. We end by suggesting points of departure for continued empirical investigations of gamified practice and its effects.

1. Introduction

The last 15 years has seen the rise of the digital game medium in entertainment, popular culture, and as an academic field of study. The success of digital games in the commercial entertainment industry – seen in record-breaking console sales and massively occupied online multiplayer environments – has spurred research into their effects and relevance in the digital age. The notion of the solitary teenaged white male gamer is no longer relevant: the average gamer is 30 years old, is 45% likely to be female, tends to play puzzle, board or casual games, and is likely a part of the 62% who play games socially (Entertainment Software Association, 2013). Although *digital* games are a relatively new development, games have existed in human cultures since the dawn of recorded culture as tools for entertainment, relationship-building, training, and arguably survival (McGonigal, 2011). Games are firmly entrenched in human culture, continuing to influence our social and leisure lives on a scale unprecedented and yet historically anticipated.

The gains made by the digital game medium has motivated its adoption for pursuits beyond entertainment. An emerging strategy in this area is *gamification*, which has been largely, though inconsistently, referred to as the selective incorporation of game elements into an interactive system without a fully-fledged game as the end product (Deterding, 2012; Deterding et al., 2011a, 2011c). In general, the term is used to describe those features of an interactive system that aim to motivate and engage end-users through the use of game elements and mechanics. As yet, there is no agreed upon standard definition; likewise, there is little cohesion with respect to theoretical underpinnings and what gamification encompasses. Even so, numerous efforts have sought to take advantage of the alleged motivational benefits of gamification approaches despite a lack of empirical research and standards of practice for design and implementation. Academic response has been polarized, ranging from outright rejection to curiosity

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expressed in exploratory papers and symposiums. The combination of its conceptual infancy and this dissonance among scholars poses an opportunity for the exploration of gamification as an object of study, an approach to design, and a computer-mediated phenomenon.

In this article, we present conceptual and practical findings from a systematic survey of the rapidly emerging academic literature on gamification. Our goals were threefold: (1) to systematically explore the theoretical and conceptual aspects of gamification in order to assess whether there is consensus on gamification as a distinct term and concept; (2) to provide a multidisciplinary review on the state-of-the-art of applied gamification research; and (3) to establish what links, if any, there are between theoretical work and applied work on gamification. In the first part of this paper, we offer an analysis of gamification from a theoretical perspective, including gamification as an evolving term, efforts to operationalize gamification as a concept, criticisms from major figures and concerns arising from its conceptual foundations and related work, and related concepts. In the second part, we present a multidisciplinary survey of gamification in action, particularly how it has been applied in computer-based systems, for what purpose, and the nature and results of empirical research. In the third part, we provide a synthesis on the links between theoretical and applied gamification work. We end this paper with a summary of findings, including suggested trajectories for future research.

2. Survey methods

A survey of the literature was conducted to produce a systematic deductive analysis of the concept of gamification and a review of applied human participant research on computer-mediated gamification systems. We used a meta-synthesis approach, which seeks to provide a well-rounded understanding and ultimately a consensus on the conceptualization of an object of study by carefully describing and then comparing and contrasting an array of sources on the topic that may be qualitative, quantitative or mixed in nature (Jensen and Allen, 1996; Heyvaert et al., 2013). A major challenge in finding appropriate sources was the diverse use of the term "gamification", which produced a range of false positives that described similar but distinct concepts. It is likely that some human participant research on what is now called gamification – work that predates the coining of the term – has been missed; a historical review of play and games beyond the last two decades is outside the scope of this survey, but may be integral to understanding the development of the concept and enriching its theoretical base, as well as providing its forerunners with due recognition.

A rigorous search of the academic literature was undertaken in all subject areas using EBSCOhost, JSTOR, Ovid, ProQuest, PubMed, Scopus, and Web of Knowledge (Table 1). This selection of databases was informed by the multidisciplinary nature of human–computer interaction research: a wide variety of databases and subject areas was necessary to capture applicable research in domains that publish to venues outside of human–computer studies. A comprehensive search using the search query "gamification OR gamif*" and reviewing sources of the types book, academic journal, report, conference materials, dissertation, thesis, and working paper yielded a combined total of 769 results on July 30, 2013. Given the early state of gamification research in studies on human–computer interaction and the tendency in this field to publish to conferences first, the vast majority of source types were conference papers, and to a lesser extent journal articles. The term "gamification" is novel and not established as a subject or thesaurus term; thus, keywords determined how papers were filtered, and criteria were established to ensure that the papers included for review met the definition established in this paper. The use of the "gamif*" keyword was an inclusive strategy meant to ensure the presence of papers that involved studies of gamification systems whose descriptions use the words "gamified", "gamify", "gamifying", or "gamifiable", all of which are grammatically valid alternatives to "gamification" when used as a verb.

The choice of inclusion or rejection of theoretical and implementation papers were made by the authors. In cases of doubt, how the keywords were used in the full article and which theoretical foundations of gamification were referenced was reviewed. However, the selection process was unexpectedly subjective; contributing factors are discussed in Section 3.2.1.

Here, theory papers encompass both conceptual papers – those that attempt to define the gamification as a concept – and theoretical papers – those that propose an explanation of the underlying nature of gamification. We define "theory" as an accumulation of possibly appropriate, already existing explanatory models from other domains that need to be tested with respect to gamification. This is in keeping with the historical trajectory of theory work in human–computer interaction: while the earliest work started with scientific theories based on observation and test–retest methodology, modern trends in theory production consider a variety of disciplinary approaches (Rogers, 2012). Theory papers were determined by the use of the keywords "concept", "conceptualize", "conceptualization", "term", "terminology", "framework", "define", "defining", "definition", "theory", "theorize", and "theorizing". Thirty-six papers passed an initial title-based screening. One non-indexed paper was added at the author's discretion based on its relevance despite the early stage of the work. Upon review of the abstracts, a total of 12 papers were selected.

To be included as an implementation paper, four criteria had to be met: (a) original, peer-reviewed empirical research was

Table 1
Databases accessed, query method, and search results.

Database	Query (if modified by search engine)	Source types (if available)	Total
EBSCOhost		Books, Academic Journals, Reports, Conference Materials	79
JSTOR	((gamification) OR (gamif*)) AND ((cty:(journal) AND ty:(fla OR edi OR nws OR mis)) OR cty:(book))	Articles, Books, Miscellaneous	30
OVID			75
ProQuest		Scholarly Journals, Dissertations and Theses, Conference Papers and Proceedings, Reports, Working Papers	262
PubMed			14
Scopus	ALL(gamification OR gamif*) AND (LIMIT-TO(DOCTYPE, "cp") OR LIMIT-TO(DOCTYPE, "ar") OR LIMIT-TO(DOCTYPE, "ip"))		255
Web of Knowledge	Topic=(gamification) OR Topic=(gamif*)		54
All databases			769