Evaluation of a Theoretical Model for Gamification in Workplace IS context

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Abstract:
This term project paper aims to find a guiding theoretical framework for gamification in workplace IS context and then evaluate the corresponding model using what we have learned in class. The impact of games and gamified elements on modern world, especially on the working environment was explored in order to answer the question 'exactly what can gamification offer to employees?' and a literature review was conducted. A model proposed by Herzig on workplace IS gamification was then evaluated and certain modification was suggested based on the discussion in the paper.

1. Background Information

According to McGonigal, a world-renowned game designer, in year 2011 there were more than half a billion people worldwide playing computer and video games at least an hour a day. Report of entertainment software association said in year 2013, 58% of Americans play video games, and there are an average of 2 gamers in each game-playing U.S. household (Entertainment Software Association 2008, 2008). A series of new reports from DFC Intelligence forecasts that the global market for video games is
expected to grow from $67 billion in 2012 to $82 billion in 2017. Literally no other industry in our modern world can equal the online game sector in its extreme popularity or explosive growth in the past decade, or even in the future. So great is our passion for games, our human beings, especially the younger generation are becoming increasingly more dependent on the fun arises from our daily engagement. Observe the world around us, there are countless gamified applications sprung in the past decade to cater for people's demand for fun and to motivate us toward certain desired activities. There are stairs bear the appearance of a piano keyboard with built-in sound generating system to encourage people making less use of elevators, there are people turns charitable donations into a game to attract more funds, there are also tons of education programs using badges, role playing scenarios or even running around epics (web link 1) to achieve better outcome. The logic is simple here: If games are so good at motivating people for thousands of years, why not introducing the key elements into our function-oriented environment to help us achieve better individual output in these fields?

2. Introduction of Gamification

To wit, the practice of introducing game elements and mechanics into other contexts has been on-going for a long time, especially in the field of human-computer interaction (HCI). In the early 1980s, Malone issued the question 'How can the features that make computer games captivating be
used to make other user interfaces interesting and enjoyable to use?' in his paper and also suggested that some game features could be used in designing instructional environments to 'make systems enjoyable' (Malone 1981, 333-369; Malone 1982, 63-68). Jung et al suggested that individuals' motivations to perform a better job could be significantly influenced by a system's human-computer interface if designed properly (Jung, Schneider, and Valacich 2010, 724-742).

The word 'Gamification' is a relatively new terminology, first proposed by a British-born computer programmer and inventor Nick Pelling in 2002 (Marczewski 2012), it did not see widespread adoption until 2010 (Ruggiero 2013, 5190-5192) (Deterding et al. 2011, 9-15), with conferences and industry backing. There are many attempts trying to define 'gamification' from different perspectives, e.g. (Huotari and Hamari 2011) (Herzig, Strahringer, and Ameling 2012, 793-804) (Werbach and Hunter 2012), while the most cited concept goes in general as: 'Gamification' is the use of game design elements in non-game contexts (Deterding et al. 2011, 9-15). In a business context, gamification is defined as 'the process of integrating game

---An Introduction to Game Dynamics
mechanics and dynamics into a website, business service, online community, content portal, marketing campaign or even internal business processes, in order to drive participation and engagement by target audiences'(An Introduction to Game Dynamics - www.bunchball.com). Parallel terms continue being used and new ones are still being introduced, such as 'productivity games', 'surveillance entertainment', 'funware', 'playful design', 'behavioral games', 'game layer' or 'applied gaming' (natronbaxter.com) (Deterding et al. 2011, 9-15). The overall goal of gamification is to more deeply engage with consumers, employees, partners and other audiences, and inspire them to participate, collaborate, share and interact in some activity or community (An Introduction to Game Dynamics - www.bunchball.com).

3. Literature Review

Massive bodies upon the study of gamification can be loosely classified into three subjects: gaming motivation specification and elements identification, implementation practice in a given context (most of them focus on marketing or education), framework for designing and exploration on theoretical guidance. Most of the papers on gamification cover one or two the subjects mentioned above. See below for more detailed information.

- Gaming motivation specification and elements identification

This part of work aims to answer one basic question for gamification practice: exactly what 'game design elements' are worth implementing into
'non-game contexts' in order to drive desired participation and engagement. Given the growing trend of gamification practice, to achieve a better understanding on gaming motivations exerts an increasingly important practical significance. Lazzaro et al (Lazarro 2004) conducted a research study on player experience and identified four Keys that are dominant on players' emotion toward games: hard fun, easy fun, altered states and the people factor. Yee et al have developed a validated motivation model via factor analysis in which achievement, immersion and social factors are taken as three major components of online gaming motivations (Yee 2006, 772-775; Yee, Ducheneaut, and Nelson 2012, 2803-2806). Ryan applied self-determination theory (SDT) to account for player motivation in gaming contexts and predicted that game features that conduce to increased perceptions of autonomy, competence, and relatedness enhance users' motivation to play (Ryan, Rigby, and Przybylski 2006, 344-360). Liu et al have approached gamification incentives from a HCI point of view: the social psychology motivations and the economic incentives (Liu, Alexandrova, and Nakajima 2011, 7-12). Even before the terminology 'gamification' came out, there are studies evaluating the effects of extrinsic rewards on intrinsic motivation. A meta-analysis of 128 studies was conducted by Deci et al (Dennis, Wixom, and Vandenberg 2001, 167-193) suggesting that engagement-contingent, completion-contingent, and performance-contingent rewards significantly undermined free-choice
intrinsic motivation.

In 'the pyramid of gamification elements' designed by Werbach (Werbach and Hunter 2012), game components are classified into three categories (from top to bottom: Dynamics, Mechanics, Components). Reeves and Read identifies 'ten ingredients of great games' in their book (Reeves and Read 2009), elements such as 'self-representation with avatars', 'three-dimensional environments' and 'narrative context' have been explored. Yu-kai Chou’s Octalysis gamification framework (web link 2) is also well-cited and provided a comprehensive collection of game elements from various dimensions of motivation. See below for a demonstration of Chou’s gamification framework.

![Chou's gamification framework](image)
Implementation practice in a given context

Marketing:

By using the mechanics of digital gaming, companies in a wide range of industries are boosting innovation, building more effective marketing campaigns and driving value (web link 3). In Zichermann's book (Zichermann and Linder 2010) he states that 'games represent unprecedented opportunities in marketing’ and game mechanics should be used in interaction design and digital marketing. Huotari's paper 'Gamification from the perspective of service marketing' (Huotari and Hamari 2011) aims to bridge game design patterns to service or marketing, in which three key concepts of service marketing were defined (service, service system and service package) examples of gamified services can be seen as follows.

<table>
<thead>
<tr>
<th>Core Service</th>
<th>Enhancing Service</th>
<th>Gamified Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile in LinkedIn</td>
<td>Progress bar for measuring progress in filling personal details</td>
<td>The enhancing service increases the perceived value of filling all details by invoking progress-related psychological biases</td>
</tr>
<tr>
<td>Cafe</td>
<td>Mayorship competition in foursquare</td>
<td>The enhancing service creates a competition between customers where they have to visit the cafe frequently enough -&gt; retention</td>
</tr>
<tr>
<td>Dry cleaner</td>
<td>Loyalty stamp card. You get 1 stamp for every visit</td>
<td>The enhancing service invokes the psychological biases related to progress and thus increases the perceived value of using the same dry cleaner service</td>
</tr>
<tr>
<td>Gym</td>
<td>Exercise</td>
<td>Gym experience that sets goals and helps to monitor the progress of the training</td>
</tr>
</tbody>
</table>

Two case studies were presented in Liu et al' paper (Liu, Alexandrova, and Nakajima 2011, 7-12): a mobile crowd sourcing application designed for image based social search across languages, called UbiAsk, and a persuasive application for motivating users to reduce CO2 emissions named EcoIsland.
They concluded that the game-based incentive methods only work with a careful design.

Education:

The use of gamification in the field of education is not a new phenomenon. Technology in schools has evolved considerably in the past decade and gaming has become pervasive within all demographic subgroups. Renaud et al (Renaud and Wagoner 2011, 56-59) argued that video games often do a better job of teaching than de-contextualized, skill-and-drill instruction. In Landers and Callan’s paper (Landers and Callan 2011, 399-423) online social network was deployed with casual social gaming elements to encourage students to complete optional multiple choice quizzes in their free time. Relevant examples of e-learning through gamification are examined by Muntean and conclusion was drawn that gamification can constitute a powerful boost to students' determination to study/read more (Muntean 2011, 323-329).

Other:

Lauckner and Baldwin incorporated some type of gamification into a newly developed website and received positive results (Lauckner and Baldwin ). They also assert that if users have a positive and meaningful game-based experience that is well-connected to the underlying non-game setting, then the organization will benefit in the long term. Innsbruck et al have built OntoGame framework to facilitate the ontology alignment process.
SpotTheLink, the casual game they designed, allows for the definition of mappings between Semantic Web ontologies as part of a collaborative game experience (Thaler, Simperl, and Siorpaes 2011, 246-253).

➤ Framework for designing and theoretical guidance exploration

Kevin Werbach enriched the connotation of gamification by proposing the following principles in design thinking: Purposive, Human Centered, Balance of analytics & creative, and Iterative, he also established a design framework including 6 procedures from 'Define business objectives' to 'Deploy the appropriate tools' (Werbach and Hunter 2012). This framework was later used by Kuutti to develop a new empirically justified framework based on modified Fogg Behavior Model (with substituted motivators from SDT) for designing gamification (Julius and Salo 2013). Francisco et al (Aparicio et al. 2012, 17) have proposed a method that can be repeated for each of the goals or tasks that define the specific business model where you want to perform the process of gamification. The model is defined by an iterative sequence of activities: 1) identification of the main objective; 2) identification of the transversal objective; 3) selection of game mechanics; 4) analysis of the effectiveness. In a recently published paper Francisco and Brangier suggested a design approach focused on gamification which aims to identify the factors to be taken into account in gamification design (intention, situation, task, users). Two major steps are included in their proposed design process: context analysis and iterative conception.
(Marache-Francisco and Brangier 2013, 126-131), see below for the process diagram (UCD stands for ‘user centered design’).

Nicholson (Nicholson 2012) has introduced the concept of meaningful gamification through a user-centered exploration of theories behind organismic integration theory, situational relevance, situated motivational affordance, universal design for learning, and player-generated content. Based on the technology acceptance model (TAM) and the DeLone & McLean information system success model and flow theory, Herzig et al proposed a theoretical model for gamification using partial least squares (PLS) for analysis (Herzig, Strahringer, and Ameling 2012, 793-804). After reviewing relevant industrial/organizational psychological theories, Landers and Callan (Landers and Callan 2011, 399-423) proposed an Idealized model of the determinants of course performance in relation to games based on Campbell’s comprehensive model of the determinants of job performance (Campbell et al. 1993). Kärp and Tanel validated the use of gamification to
drive pro-environmental behavior change by deploying an experimental prototype which was developed based on Eric Ries’ Lean Startup ideology and Yu-kai Chou’s Octalysis gamification framework (Kärp 2013).

4. Research Question

Up to now, gamification is mainly driven by company practice and implementation, this is especially so in the workplace. Since the literal beginning of the gamification industry in 2010, over 350 companies have launched major gamification projects. These include MLB, Adobe, NBC, Walgreens, Ford, Oracle, SAP, etc (web link 4). Google and Microsoft have created games to increase worker morale, quality control, and productivity; Cisco has developed a 'sim' called myPlanNet, in which players become CEOs of service providers, and adopted gaming strategies to enhance its virtual global sales meeting and call center, lessening call time by 15 percent and improving sales between 8 percent and 12 percent; FedEx and airlines deploy game simulations to train pilots... (Web link 5) However, as noted in the literature review part, there are no well accepted theoretical models for...
gamification and most companies work their own way to gamify specific IS with no theory serves as guideline. Before this study goes to the candidate model evaluation, one essential question has to be answered: exactly what can gamification offer to companies' employees that are attractive for various enterprises?

According to Gartner (web link 6), gamification can help to achieve the following broad business objectives:

1) To change behavior, e.g. companies can use gamification to improve employee performance and to motivate adoption of new business processes.
2) To develop skills, gamification is increasingly being used in both formal education and in corporate training programs to engage students in a more immersive learning experience.
3) To enable innovation. Innovation games use emergent game structures that provide the goals, rules, tools and play space for the players to explore, experiment, collaborate and solve problems.

The classification above is not the only gamification functions proposed by researchers, RedCritter Tracker (web link 7), the first issued gamified project management software, asserts that workplace gamification has the following benefits:

1) Increases employee productivity
2) Increases quality of work
3) Improves employee morale
4) Increases employee retention

5) Creates an exciting work environment

There are many other justification of gamification in workplace and most of them look alike (see the two examples above); in other cases terms might be slightly different, such as problem solving, teamwork, creativity, novelty, knowledge sharing, etc. In sum, all the relative studies suggest that gamification can serve as a useful tool for employee engagement, which was defined as 'the emotional commitment the employee has to the organization and its goals’ according to Forbes Magazine. Due to the scanty attention paid to the theoretical framework study on gamification in workplace, I decided to put my research question as: Which existing approaches are well suited to study and model gamified information systems in workplace?

For the literature I reviewed about theoretical guidance exploration on gamification, No model was provided to illustrate the structure of the theory in Nicholson's paper (Nicholson 2012) and the proposed framework is composed of five separate theories, literally complex for designers to follow (according to what we learned in class, usually a model of the domain is required for the description of a theory). The idealized model of the determinants of course performance proposed by Landers and Callan (Landers and Callan 2011, 399-423) focuses mostly on the domain of education and not necessarily related to IS/IT context. For now I haven't been able to find the full text of Kärp and Tanel's paper (Kärp 2013), so I can
only offer a brief description of their paper based on the issued abstract. Herzig (Herzig et al., 2012) proposed a theoretical model for gamification in workplace using technology acceptance model (TAM), the DeLone & McLean information system success model and flow theory. This model focused on the study of workplace gamification, in which gamification was defined as 'The adoption of game mechanics into serious contexts such as business applications'. Not only was the model highly related to IS context, it was accompanied with an empirical study using SAP ERP as example, and the structure (especially the TAM part) are suitable for me to conduct evaluation. Based on the above discussion, I decided to explore the rationality of Herzig's model on workplace IS gamification.

5. Model Evaluation

Be sure you start with an experience that stands on its own as worthwhile for your audience, and then gamification can only make it better. --- Barry Kirk

5.1 Model Description

In Herzig's model, TAM was used as the base model, Flow(with antecedents in the context) serves as a determinant of both perceived usefulness (PU) and perceived ease of use (PEOU), and the impact of both visualizations on user is measured on individual’s level according to D&M IS Success Model.
Before any discussion was made about the model, its three major components: technology acceptance model (TAM), the DeLone & McLean information system success model and flow theory were briefly introduced as following:

- **TAM, the base model**

  TAM is an information systems theory that models how users come to accept and use a technology. It posits that two particular beliefs, PU and PEOU, are of primary relevance for computer acceptance behaviors. (Davis, Bagozzi, and Warshaw 1989, 982-1003)

  PU stands for the perspective user's subjective probability that using a specific application system will increase his or her performance within an organizational context.

  PEOU refers to the degree to which the prospective user expects the target system to be free of effort.

- **D&M IS Success Model**

  DeLone and McLean proposed a comprehensive, multidimensional model of IS success in 1992 (DeLone and McLean 1992, 60-95), based on
communications research of Shannon and Weaver (Shannon 2001, 3-55), information “influence” theory of Mason (Mason 1978, 219-234) (Delone 2003, 9-30) and empirical management information systems (MIS) research studies from 1981–87. The goal of the DeLone and McLean IS Success Model (D&M Success Model) was to synthesize previous research on IS success measurement into a more coherent body of knowledge and to provide theoretical guidance to future researchers (Delone 2003, 9-30). Structure of the model can be illustrated as following:

In year 2003, DeLone and McLean proposed an updated D&M IS Success Model based on changes in the role and management of information systems (Delone 2003, 9-30), and this new version became much cited and adopted since then.
Flow theory

According to Csikszentmihalyi, the founder of Flow Theory, flow is described as the experience of complete absorption in the present moment, and the experiential approach to positive psychology that it represents (Nakamura and Csikszentmihalyi 2009, 195-206). Flow theory focuses highly on motivation. It is a single-minded immersion and represents the ultimate experience in harnessing the emotions in the service of performing and learning (web link 8). Following is a demonstration of Flow Theory.

![Flow Channel Diagram](image)

Based on all the theories we just introduced, the comprehensive model in Herzig's paper was illustrated as following, since we will not focus on its test of hypothesis, no detail description is provided.
Since this paper focused on one empirical gamification practice (SAP ERP in this case), in the model provided one can only see the comparison part of the study (with or without Interactivity, etc). Inferring from the other theories discussed in the paper (e.g. the impact evaluation based on D&M IS Success Model), a more comprehensive model is illustrated below:

System quality, information quality and service quality here represent the IS structure before the implementation of gamification, since the major function of gamification in the given context is to improve existing processes or attributes of certain IS elements, the 'Net Benefits' here stand
for the function improvement of a gamified IS.

One more thing need to be mentioned here is that the TAM model applied here is not the original TAM, the removal of 'Attitude' happens only in the later version of TAM(Venkatesh and Davis 2000, 186-204; Venkatesh and Bala 2008, 273-315) and 'Enjoyment' serving as an antecedent of PEOU only exists in TAM 3.

Before go through each component of the comprehensive model to conduct any evaluation or suggest any modification, the following points should be noted.

Purpose of Gamification: using gamified elements to motivate people to engage in desired behavior/action.

Purpose of the paper we studied: to offer a theoretical framework to guide practitioners in the process of gamification implementation and design in an workplace IS context.

Purpose of the model we derived from the theory: to describe the theoretical framework, to represent phenomena in the domain.

In this case, domain stands for: the adoption of game elements into workplace IS context.

What do I want to do in my project?

- To evaluate the theory, especially the TAM part (5.2)
- To suggest possible modification if needed (6)
5.2 Model Evaluation

1. TAM part

- Advantages inherited from TAM

The original version of TAM has relatively simple structure and it is easy to be understood so long the PU and PEOU can be identified and make sense. The theory is already well-accepted in the context of IS acceptance and there are lot of supported empirical studies with comprehensive theoretical framework to learn from and make analogy. Say, Koufaris applied the Technology Acceptance Model and Flow Theory to Online Consumer Behavior study and to some extent are similar to the model that going to be evaluated. Besides, game developers and players have critiqued gamification on the grounds that it gets games wrong, mistaking incidental properties like points and levels for primary features like interactions with behavioral complexity (Bogost 2011) and failing on individual perspective. TAM serves extremely well following the human-oriented (compare to function-oriented) principle in this case and the model (TAM) is often applied to organizational
use and rejection while the model was constructed for individual acceptance or rejection. (Bradley 2013)

➢ Disadvantages inherited from TAM

The continuing effort to expand TAM has led to a state of theoretical chaos and confusion in which it is not clear which version of the many iterations of TAM is the commonly accepted one (Benbasat and Barki 2007, 211-218). The version chaos demonstrates itself quite clear here: the integrated TAM part in the model is a modified TAM which has its traits from many versions. Comparing to the original version, ‘attitude’ is missing, ‘enjoyment’ is added, ‘subjective norm’ (exist in later versions) is not included.

PU & PEOU are misleading in a gamification context. According to Benbasat, the intense focus on TAM has diverted researchers' attention away from other important research issues (Benbasat and Barki 2007, 211-218). Sense most gamification practice in IS context focus on the adding of game elements into existing procedures or entities, fun is the utmost goal. The separation of PU & PEOU seems superfluous here and the lack of 'fun' stressing make the TAM part not distinguishable from other IS context besides gamification. Besides, you can’t just walk into a CEO’s office and tell him “improve your employees’ perceived usefulness then there is profit” since the unobservable constructs are hard to identify.

TAM also has questionable measurement. As noted by Sharma & Rajeev, common method variance (CMV) explains 56.09 percent ( p <0.05) of the
between-studies variance in TAM's PU-PEOU correlations (Sharma, Yetton, and Crawford 2009, 114-121).

Fitness into Gamification Context

The rationality of PU & PEOU is worth discussion. As mentioned before, introducing gamified attributes to an existing IS doesn’t have much to do with PU. Even if PU has its role in the procedure, the construct itself is hard to be distinguished from PEOU. In addition, setting enjoyment as one of the antecedents of PEOU seems a compromised way to adapt the TAM model. Take Heijden & Hans' study on user acceptance of hedonic information systems (Van der Heijden 2004, 695-704) for example, they recommend adopting 'perceived enjoyment' as one of the antecedents of 'intention to use' (see the figure below), but in the later version (TAM 3) 'enjoyment' became an antecedent of PEOU in order to be fitted into the model.

Based on the discussion above, since TAM is a behavioral model has its root in Theory of Reasoned Action (TRA), I personally think the combination of
PU and PEOU back into ‘Attitude’ would make the explanation work much easier and there will be no need to further distinguish different antecedents into categories. Here the construct 'Attitude' means individual's positive or negative feeling about performing the target behavior (e.g., using a system).

Should subjective norm, a construct exists in later TAM versions, be taken into consideration? Here subjective norm stands for a person's perception that most people who are important to him think he should or should not perform the behavior in question (Venkatesh and Davis 2000, 186-204). My answer is ‘Yes’, since well-designed gamified elements should be effectively integrated into existing IS procedures or entities, subjective norm will work the same way as it works in a non gamified IS and the attitude of one's cared ones toward gamified elements will surely exerts some influence on people's behaviors. Say, your life is surrounded by a group of elderly people who think the idea of 'gamify IS' totally makes nonsense and imposed it on you, evidently you will not be that positive about the implementation of gamification.

So, if 'subjective norm' should be included, where should this construct appear in the model? My opinion is: parallel to the motivation part, in this
case, the ‘flow theory’, the ‘subjective norm’ here should be distinguished from the social aspect of motivation that originated from IS users (Yee 2006, 772-775).

The rationality of 'enjoyment' here also worth discussion, since in a gamification context where the implementation is all about adding gamified elements the 'Flow' is sure to possess some fun or enjoyment aspect. Besides, being a parallel antecedent of PEOU with 'Flow', the single standing of 'Enjoyment' with no specific antecedents and no reasonable measurement makes it highly possible that there might be some overlaps between 'Flow' and 'Enjoyment'. So I recommend using detailed motivation framework to cover and substitute the ‘enjoyment’ construct.

2. Flow theory

![Flow Theory Diagram](image-url)
Origin of the Flow Concept

While studying the creative process in the 1960s (Getzels and Csikszentmihalyi 1976), Csikszentmihalyi was struck by the fact that when work on a painting was going well, the artist persisted single-mindedly, disregarding hunger, fatigue, and discomfort---yet rapidly lost interest in the artistic creation once it had been completed (Nakamura and Csikszentmihalyi 2002, 89-105). The ensuing Flow Theory originated from the desire to better understand the above phenomenon, to put it more specifically: the intrinsically motivated activities. The 'Perceived Challenge' here represents a sense that one is engaging challenges at a level appropriate to one's capacities; 'Skill' stands for one's existing working skills; and there should be clear proximal goals and immediate feedback about the progress that is being made (Nakamura and Csikszentmihalyi 2002, 89-105).

Advantages

According to Csikszentmihalyi, the great majority of flow experiences are reported when working, not when in leisure (Csikszentmihalyi and LeFevre 1989, 815). Better explanatory power on working environments makes the theory seems more appropriate in a workplace IS context. Besides, Flow theory focus only on instinct motivation, which are accepted by the modern gamification research field as the most important motivation aspect. While game mechanics such as points and badges are the hallmarks of gamification, the real challenge now is to design user-centric applications that focus on the
motivations and rewards that truly engage players more fully (web link 9). Game mechanics like points, badges and leader boards are simply the tools that implement the underlying engagement models. According to Gartner, poor game design is one of the key failings of many gamified applications today. So, could Flow Theory serve as judging criteria of whether gamified elements are well designed? Well, the good picture is if the IS can already keep users in the right zone, the trouble is saved and if not, the gamification practice would know which direction to work towards according to 'flow'. But there is another picture:

- Disadvantages

The other picture shows that Flow Theory is more suitable to judge the individual wellbeing in a given working environment than the intrinsic motivations, since the 'obligatory nature of work' will cause employees judging their desires by social conventions and conducting more of those activities that provide the least positive experiences and avoid the activities that are the source of their most positive and intense feelings (Csikszentmihalyi and LeFevre 1989, 815). The sad truth is gamification can’t directly serve as a way to increase skill or challenge or individual's wellbeing, it can only help to make the process of increasing skill or modifying challenge more enjoyable or relaxing. So, confined to the gamification context, I personally think Flow Theory is not adequate to cover the motivation impetus caused by gamified elements.
Csikszentmihalyi also noticed that regardless of the quality of experience, respondents are more motivated in leisure than in work. Although flow improved motivation in comparison with non-flow (ANOVA $F = 6.1$, $p< .02$), whether one was working or in leisure ($F = 61.7$, $p < .0001$) was a much more important factor than whether one was in flow or not. While Flow Theory seems able to justify the use of gamification (making work experience more leisure hours alike), it seems unqualified to explain the motivation caused merely by gamification practice.

Based on the above discussion, what factors should be included in this part of the model? Game motivations (can be identified from game elements, both intrinsic and extrinsic ones) should be the most important constructs to explain employees' attitude aspect (in this case PU & PEOU). Design quality should also be included: it is true that we have to fully understand people's motivation to play games to better perform gamification, but good manipulation of game-related motivation doesn't necessary mean the success of corresponding gamification in an IS context. According to Gartner, 'poor design' it is the top reason leading to the failure of gamification.

3. D&M IS success model
Background

This part of the model was only described in the paper I studied so the illustration above is merely inferred. The later version of D&M IS success model is chosen because the separation of intention and actual usage makes the combination with TAM much easier and understandable. Net benefits include individual impact and organizational impact. In the given context, the 'net benefits' represents the improvement of benefits after gamification (such as shortened process period, or more successful training result).

Behavioral intention is a construct from TAM and combined with ‘intention to use’ in the IS success model.

For now I think the D&M IS success model is suitable in the suggested context because 1) the ultimate goal of gamification here is to improve the effective engagement of workplace IS users and to increase the net benefits of companies or organizations; 2) TAM or TRA can only explain the impact of gamification on personal behavior, while the D&M IS success model extends the framework to social influence aspect; 3) Bad gamification is a
6. Modification & Discussion

By 2014, 80 Percent of Current Gamified Applications Will Fail to Meet Business Objectives Primarily Due to Poor Design. --Gartner 2011

Based on the evaluation above, a modified model is proposed as following.

- Features of the model:
  1) TRA takes TAM's place, which means PEOU & PU are combined into Attitude, subjective norm is also included in the modified model.
  2) Flow theory is removed, Design Quality and Game Motivation now serve as antecedents of Attitude (due to time limit, for now I haven't find a most suitable motivation theory to place)
3) Net benefits here represent the improvement of benefits after gamification (such as shortened process period, or more successful training result)

Some Question & Discussion:

1) How to measure ‘Design Quality’?

According to what we learned in class, a qualified model should be able to offer some theoretical guidance to design artifacts and the manifested principles should be well suited into the studied domain in way they operate (Wand 2013). For all the frameworks of gamification design I reviewed, Francisco and Brangier's (Marache-Francisco and Brangier 2013, 126-131) model are too general to follow, lacking the specific guidance to gamification context. Kevin Werbach's model briefly and clearly demonstrated the implementation procedures of gamification and relevant constructs are arranged in an organized way. Efficient in guiding empirical work as the model is, it is not that easy to identify antecedents of employees' attitude from specific procedures such as 'delineate target behaviors' or 'describe your players'. Unlike the one way process of Kevin Werbach's model, Aparicio Francisco's model (Aparicio et al. 2012, 17) is defined by an iterative sequence of activities from which four constructs can be extracted regarding design quality serving as antecedents of attitude: main objective, transversal objective, rationality of selected game mechanics, effectiveness of design. Whether these four constructs having the validity to represent design quality or not still worth further exploration.
2) Which motivation theory is more suitable here to serve as antecedents of ‘attitude’?

First and for most, we should notice that both intrinsic and extrinsic motivations play their role in workplace gamification, although intrinsic motivation studies is the mainstream in present gamification context. Extrinsic motivation refers to behavior that is driven by external rewards such as money, fame, grades, and praise (web link 10). This type of motivation arises from outside the individual, examples of gamification practice using extrinsic motivation include the points and leader boards in a workplace IS that 'pushes' employees to perform better. Contrary to external motivation, intrinsic motivation refers to behavior that is driven by internal rewards. In other words, the motivation to engage in a behavior arises from within the individual because it is intrinsically rewarding (web link 11). An example is that games-based training focuses on intrinsic motivation from winning challenges and accomplishing tasks that release positive chemicals into the brain (web link 4).

Since there are so many candidates for the motivation theory part (see literature review), for now I didn’t have enough understanding to judge which one is better. Some of them focus on general aspect of motivation, say, the Self-Determination Theory (SDT), where different types of motivation are distinguished based on the different reasons or goals that give rise to an action (Ryan and Deci 2000, 54-67). One mini-theory of SDT, cognitive
evaluation theory, is specifically concerned with contextual factors that support or thwart intrinsic motivation (Deci and Ryan 1985) (Ryan and Deci 2000, 54-67). Some theories make more motivational categories based on gamified elements, such as Chou’s gamification framework and Yee's validated motivation model via factor analysis (see literature review). More investigation is needed to find a qualified motivation theory serving as antecedents of attitude here.

3) How to better justify the role of ‘Subjective Norm’ in a workplace gamification context?

I included this construct because subjective norm will affect gamified IS elements the same way it affects IS before gamification. But are there any specific features of this construct in gamification context? I think this construct needs more discussion in the future.

4) Can ontology help to offer some guidance?

Some gamified elements are implemented into the IS, say, using gamified elements (badges, leader board, etc) in IS to improve employees’ productivity. Some are outside or even independent to the existing IS, yet they exert certain subtle influence on the IS performance via motivated employees. For example, at Google engineers have been able to spend an in-house currency called “Goobles” on server time or use it to bet on certain outcomes as part of a company-wide predictions market (web link 5). As we discussed, some gamification are devised to enhance existing process, some
are independently to serve the purpose. Besides, the feature and novel characteristics of gamified applications are hard to place a term in the traditional IS context. So, whether ontology can help to offer some guidance on the structure illustration of gamified IS environment is also something worth exploration.

Conclusion

I really enjoyed the experience of exploring gamification theoretical framework in a workplace IS context and there are so much more work to be done. I believe in the worth of games and genuinely think gamified elements will play an increasingly significant role in modern working environment. Thank you so much for your help and guidance, Yair! Wish you a happy and fruitful new semester.
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