Gamification Elements and Their Perception by Different Gamer Types

A Case Study for a Project Management Software

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Abstract

Gamification is being applied more and more to information systems. Many developers apply similar strategies for the gamification of tasks. A benchmark conducted in 22 mobile apps containing gamification elements showed reward points as the most frequent design element. In a pilot user experiment, we analyzed the user perception of three gamification elements including reward points in the context of project management. Reward points are seen as motivating; in contrast a leader board was viewed more critically. It was shown that the judgment of elements depends on the game personality type. The gamer type Killer had a medium and significant correlation with a positive evaluation of the gaming elements. Only the gamer type Achiever had a positive and significant correlation with a positive judgment of rewards points.

Keywords: gamification; human-computer interaction; project management; motivation

1   Introduction

Games are playful activities, usually associated with fixed rules and done for enjoyment. Games can focus either on competitive or on cooperative behavior. Gamification is the introduction of game elements into other non-game related contexts. Gamification has been seen as a promising strategy in information systems to transfer positive aspects of games like enjoyment to other activities (Hamari & Koivisto, 2015). Gamification is mostly intended to motivate and involve users for work and other tasks like conserving energy. Positive effects can be higher enjoyment of users and better performance on the main task. Negative effects can include lower productivity through time spent on the game aspects and boredom if the game is not accepted or loses its attractiveness. Many studies on gamification in information systems have reported positive results (Thiebes et al., 2014; Hamari et al., 2014) but also doubts have been raised about the reliability of the research (Broer, 2014). People with different personality might enjoy different game designs or different elements of gamification. The acceptance of gamification may differ from person to person.

2   State of the art

Gamification was defined as "a process of enhancing a service with affordances for gameful experiences in order to support user's overall value creation" (Huotari & Hamari, 2012: 19).

Improved motivation through gamification can be explained by the self-determination theory (Ryan & Deci, 2000). Humans are intrinsically motivated to fulfil their own basic needs. These include autonomy, competence and relatedness. All three of these factors are emphasized by games. Users act autonomously, gain game competence during the play and can connect to other players. Games and gamification elements need to target these basic needs. Often they also rely on extrinsic motivation through external rewards like points or physical benefits. The game related elements are not always easy to find for any task and consequently, a set of general gamification elements was developed. These have been classified by several publications. A coarse segmentation is provided by Nicholson (2013), who mentions reward-

based elements that are related to extrinsic motivation and game elements which are closely related to the primary task. An analysis by Thiebes et al. (2014) clustered the focus of the design strategies in system design, challenges, rewards, social influences and user specific. The three most often mentioned gamification elements which they name mechanics and dynamics were goals, achievements and a point system. In a literature overview, Hamari et al. (2014) identified the following so-called motivational affordances most often in research papers: points, leader boards, and achievements/badges. They also list rewards and challenge. It becomes obvious that not even the terminology in the area is yet unified and e.g. the relation between challenges, achievements and badges remain unclear. This is also the result of a literature analysis carried out by Seaborn & Fels (2015).

Gamification is widely researched, however, in business information systems there are still few applications. The overview article of Hamari et al. (2014) lists only two studies out of 24 which were analyzed. The application areas of gamification are manifold and range from environmental protection (Goldstein et al., 2008) to fostering exercise for patients (Stuart, 2014). Of specific interest are business applications. An ERP system was evaluated by Herzig (2012) in order to identify factors for technology acceptance. Test users were required to solve some business tasks within 15 minutes. They received virtual cash, which turned out to be very motivating. The prototypical design integrated 3-dimensional virtual worlds with gamification for typical SAP tasks so the effects can be based on both design strategies. Nevertheless, such studies can help to find appropriate TAM variants for gamified systems. An interesting experiment by Zagel and Bodendorf (2014) within the area of logistics for a task involved inventories at supermarkets. They showed that the addition of gamification elements to the inventory system increased the time that users spent on the task. However, at the same time the data quality increased. For the inventory application, a higher data quality is desired so that the increased cost is acceptable.

An increased data quality and better participation was also observed by Cechanowicz et al. (2013) within the area of market research. Their game elements included brief quizzes. In a five month long study with students with project management software, Schubert et al. (2014) found out that the motivation increased overall. However, the effect may decrease over time and comparative elements are seen as potentially demotivating and problematic. The authors stress that the context of the application needs to be carefully considered.

Apart from context, the acceptance of gamification elements may highly depend on the personality of a user. The personality can be described in many ways. For computer games, an influential classification of gamer types has been suggested by Bartle (1996):

- *Achievers* intend to follow the rules and win or achieve goals. They observe their progress and absorb goals set by the game design. Achievers like to step up in levels or accumulate points.
- *Socializers* seek a social experience and want to meet others and interact with other players. They tend to use communication tools and like communities.
- *Explorers* like to interact with the world in the game. They enjoy to discover new areas and to gain knowledge about the environment of the game. Explorers are curious and like new challenges.
- *Killers* are socially motivated and like to win over and dominate other players. They prefer competition and are eager to discover and learn new strategies and tactics to succeed.

A discussion of other categories is presented in Ferro et al. (2013). However, the categories suggested by Bartle (1996) are still popular in research. They are also used in our study.

The relation between personality and gamification design has also been subject to previous research. Ferro et al. (2013) provided a thorough analysis of literature on gamer types and personality. They suggested a plausible list of assignments of game elements to gamer types. However, their assessment is purely theoretical. Some practical suggestions for the appropriate elements for gamer types are also given by Cunningham and Zichermann (2011). The research on gamification is faced with methodological challenges. The effect of gamification on users during serious work tasks is difficult to measure in experiments. This effect cannot be researched by asking users out of context. Few long term studies, like the one over five months by Schubert et al. (2014) and one over two years by Hamari (2015), have been conducted.

3   Research questions and study design

Previous research has explored many facets of gamification in information systems. Many issues require more research. An important question is

whether gamification elements may be useful for anyone or whether different personalities judge the concept differently. Our hypothesis is that based on personality people evaluate gamification differently. There are several elements or design strategies for gamification. They also might be regarded quite differently. The perception of various strategies may also depend on the personality, which is coherent with the prediction of Ferro et al. (2013). If this hypothesis is proven correct, the design of gamification systems will need to take the personality of the prospective users into account or alternatively design consciously for a diverse audience. Another consequence is that questions on system design in general are perceived quite differently by people. We intended to create a realistic user experiment with real software involving interaction in realistic test tasks. During these tasks users are exposed to the gamification elements and were asked questions about these elements later. The perception of the elements needs to be correlated to personalities according to the gamer types.

4   Study

The experiment was carried out as a user test with the online project management software RedCritter, Tracker which includes gamification elements. RedCritter Tracker allows the typical project resource allocation tasks like creating tasks within projects, assigning them to workers and supervising the performance. Our study was intended to evaluate popular gamification elements. For that we took an empirical approach. In a benchmark, we collected data on 22 apps which included gamification elements. However, only 27% are fully available in Germany. Companies seem to be reluctant to introduce gamification elements into the German mobile market. Among these apps, 82% offered reward points which could be exchanged for real vouchers or products. Half of the apps connect to social networks systems.

Based on these results, we selected an existing application which included the most frequent gamification element, a reward point system. The system is not connected to social networks but implements networking functions with a project group. The project management software RedCritter Tracker (https://www.redcrittertracker.com/) can be used online. The main gamification elements implemented in RedCritter Tracker which were in the focus

of the study are reward points, badges and a leader board. All credits can be observed in a dash board by each user. The same elements can also be found in the Kudos system integrated into IBM connections.

These three gamification elements (reward points, badges and leader board) are also the most popular ones in research according to the literature review conducted by Hamari et al. (2014). They also appear in the empirically determined list assembled by Thiebes et al. (2014). Nevertheless, the two last mentioned studies used only scientific literature to identify gamification elements and strategies. Our approach was based on real systems that were found in app stores.

Instead of just presenting the software to the test users, a task scenario was created for the experiment. Within the scenario a company created the Web site for a coffee shop. Within this project, the test users were required to execute four typical tasks. The work tasks were designed to be to be typical within web design projects. Due to the fact that students are familiar with information systems, are frequently involved in project courses, are required to collaborate in electronic environments and often work outside the university in IT companies, the simple tasks seem quite natural.

The first task required the test users to change the position of the logo within a wire frame for the Web site and the second required changing the font type within the HTML code. These software related tasks had to be solved within the prototyping software Balsamiq Mockups for Desktop (balsamiq.com). The third task consisted of finding an expert for Android within the project team and of sending a message to her or him. A fourth task was filling out a questionnaire for the study and was also awarded with reward points.

A manager approving the tasks was simulated by a second person in another room. Applying this procedure, the test users could see their progress and the effect of their actions within the gamification elements. They earned credit expressed in reward points and advanced in the leader board. The test users were advanced students from two universities, who had gained some experience in team work during their studies. They received no incentive and formed a convenience sample. The test was carried out in a lab at the university in order to create an identical environment for all test users and to create a situation with no interruptions. All tasks were shown to the user in written form on the PC so that they all received identical information. On average, the test took 40 minutes and was followed by a questionnaire and a 5 minute

interview. The exposure of the users to the system was longer than in other studies (Herzig et al., 2012) but we did not aim at long term acceptance.

The questionnaire started with a few questions about project management and focused on the perception and evaluation of the gamification elements. For all three elements, the same set of questions was asked which consisted of three parts. In the first part, the perception of the elements was in the focus and participants were asked how much attention they dedicated to the gamification elements. The second part focused on the motivation and included Likert scales with statements dedicated to the specific elements. In the third part we used semantic differentials for three pairs of adjective in order to find out about the subjective evaluation of the elements. Semantic differentials are an established instrument to identify the attitudes of people.

Next, previous experience with video games and gamer type were gathered. Then, the participants were asked for their overall judgement of the gamification and the software. The questionnaire closed with socio-demographic data. The interview was aimed at collecting qualitative information and judgements of the participants.

5   Results

The user experiment was carried out by 20 people (12 male). They mostly liked project work with the RedCritter Tracker software (90%). Of the group, 60% liked video games and 40% did not like video games. However, 60% never or rarely play video games and only 20% play video games often. We assessed the gaming personality by the Bartle test based on a questionnaire. The gamer types are distributed as shown in figure 1. As shown some of the 20 individuals were assigned to two gaming types. The type Achiever predominates, however, our sample also contains many Killers. Overall, the gamification elements were perceived as positive. The two statements whether these are useful for project management and whether the gamification elements do not pose a barrier for work both receive predominantly agreement (15% fully agree, 60% rather agree for both).
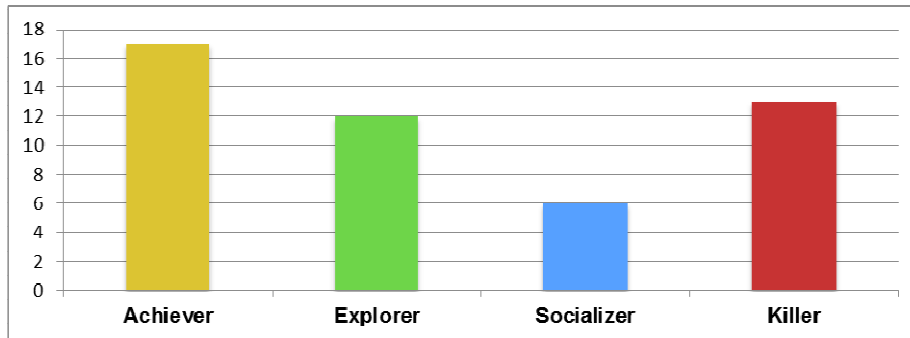
Fig. 1 Distribution of gamer types in test users

The study intends to get a differentiated judgment of the different gamification elements. Overall, the reward points were assessed most positively and the badges as most negative. The leader board received an assessment between the two other elements.

Among the three gamification elements the reward points were judged most often as positive. On a five point Likert scale for a statement about higher motivation, reward points as a gaming element received most very positive ratings and predominantly very positive and positive ratings (fig. 2).
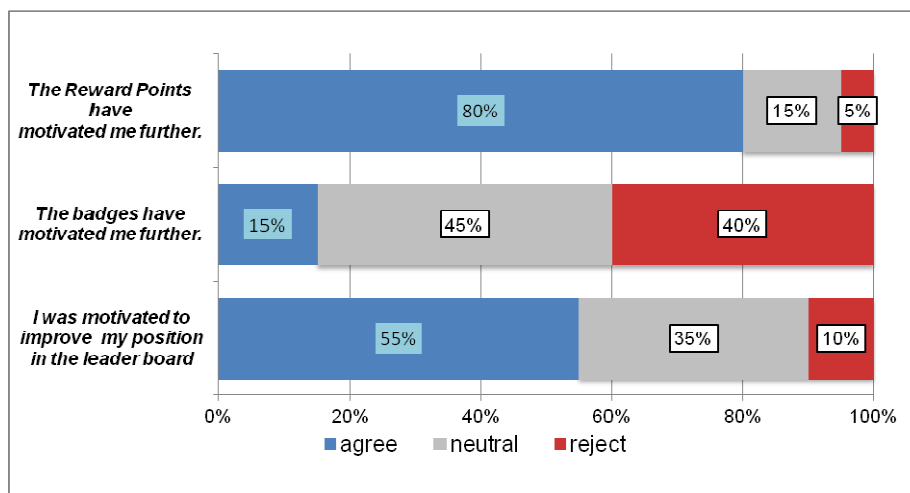

Fig. 2 Comparison of the three gamification elements

The perception of the badges was remarkably negative as figure 3 shows. Only concerning the curiosity of users, badges can get a neutral judgment on average. Subsequently, the users were asked how much attention they

had paid to the specific gamification elements. The answers are shown in figure 4. As shown, users judged that they have paid most attention to the reward points followed by the leader board. Least attention was given to the badges
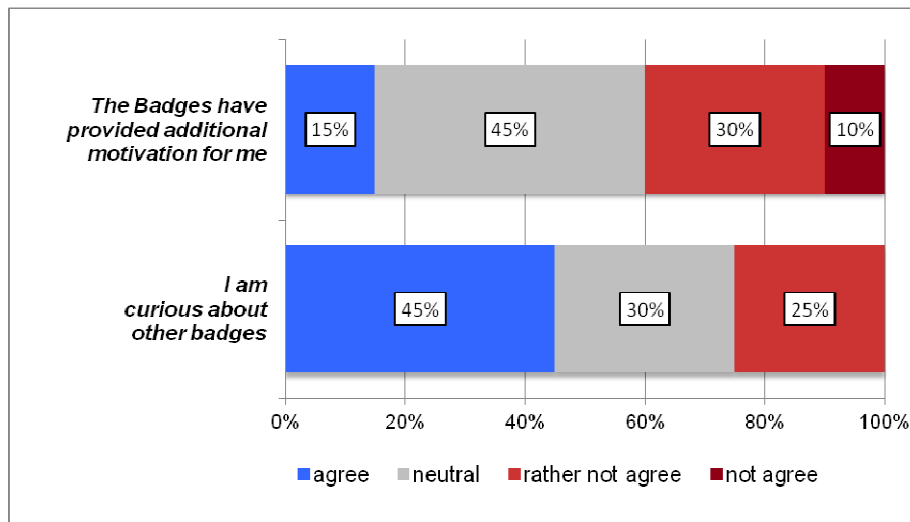

Fig. 3 Judgment of Badges

The results on perceived attention and the motivation provided by an element are in line with each other. Both questions lead to an identical ranking of the three elements under investigation.
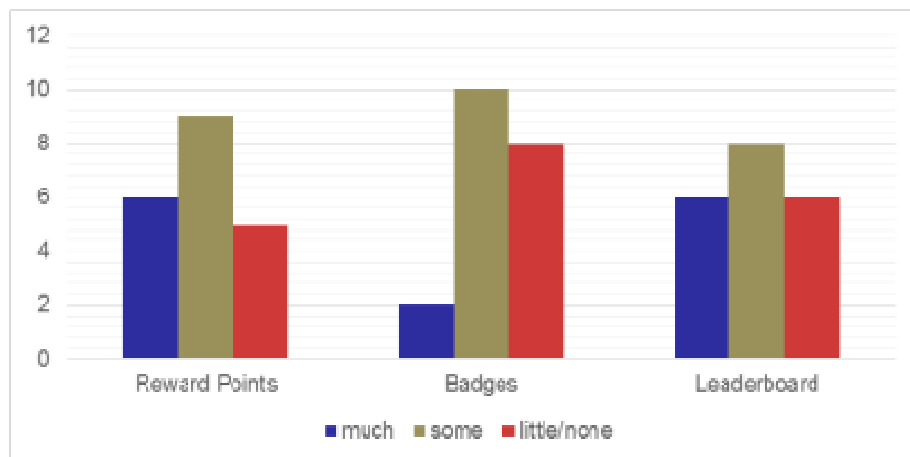

Fig. 4 Attention Dedicated to the Elements

In addition, the third way to compare the elements also leads to this ranking. In this part of the questionnaire, users were asked to rate the elements on a scale between bipolar adjectives. The semantic differential shows that the users associate the more positive adjectives with the reward points followed by the leader board as figure 5 shows. The differences between the three gamification elements are statistically significant for the first adjective pair (< 5%) and not for the second pair. For the third adjective pair, only the differences between the reward points and each of the other two elements are statistically significant (< 5%). The perception of the different gamification elements by the users is quite individual. We measured the gamer types of the 20 participants (cf. fig. 1) and searched for correlations to the judgments and preferences. Remarkably, the gamer type Killer correlated highly with an overall positive judgement of gamification elements in project management ($r = 0.54$, significant, error probability < 5%).The game type Achiever (and only this type) exhibits a medium correlation to the judgment of reward points as positive ($r = 0.55$, significant, error probability < 5%). Reward points might be mostly helpful for the personalities related to the game type Achiever.
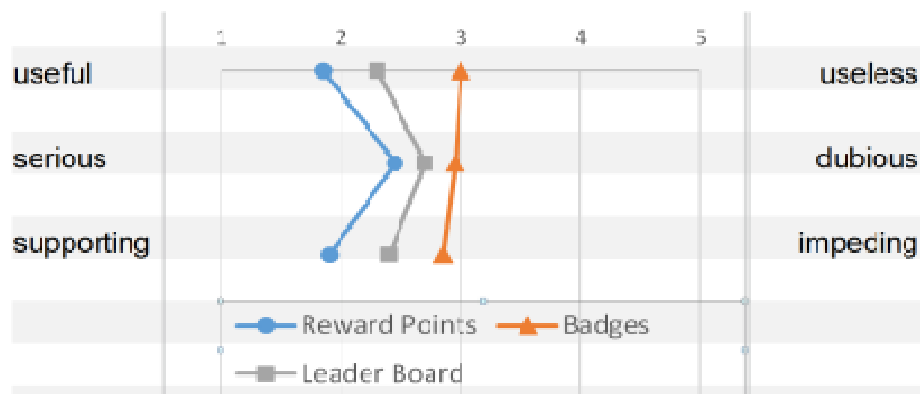

Fig. 5 Semantic Differential

In a theoretical mapping of game elements to player types, Achievers were assigned to badges and Killers to points (Ferro et al., 2013). These relations could not be found in our data. We further assessed the correlations between the answers of the users. The judgement of the leader board as supportive and the desire for competition also correlated positively ($r = 0.58$, significant, error probability < 1%). For all three elements, there is a medium

positive correlation between the judgment as useful and motivating. This is a plausible relationship.

After filling out the questionnaire, the participants had the opportunity to state their opinions in a brief interview. Most statements were again consistent with the results presented above. E.g. one person stated: "I liked the reward points a lot" Another participant said: "I like the idea that one gets rewarded for tasks, very good". Despite the overall positive assessment, one participant showed a negative attitude towards reward points in general: "The quality of the tasks fulfilment could suffer if the focus lies on the points and not the task itself". However, there is one exception. The leader board received many negative statements, e.g. "Respect among colleagues may be affected by the leader board" or "The leader board might be demotivating". These statements show that designers need to be especially careful with the attitude of their specific clients and the business culture when introducing comparative elements like a leader board (for further details see Janta Lipinski & Weber, 2015).

6   Conclusions

We reported a user test as a pilot study with the gamified project management application RedCritter Tracker (RCT). Twenty students with previous experience in project management took part in this study. A detailed questionnaire was used to determine acceptance of game mechanics. Factors indicating acceptance, such as perceived increase of motivation as well as subjective impressions towards these game mechanics were examined.

The results of the user test suggest that the game elements examined in this study were mostly accepted by the participants in the test situation. Gamification elements were also viewed as motivational. Reward Points were accepted by most participants, Badges were least accepted, and the leader board was classified in the mid-position, even though it exhibits competitive characteristics which were often regarded as negative in qualitative statements. This result is consistent with the findings of Schubert et al. (2014) who conducted a five month study with German students and found opposition against public and comparative elements like the leader board. The perception of badges as most negative is surprising since they are seen as a very

positive element in the work of Hamari (2015). On the other hand, Schubert et al. (2014) asked after the exposure of students for five months which element people would remove first. The badges were named most often despite that fact that a leader board was also present and was highly criticized. More research on the type and design of badges and the context factors for their use seem to be necessary.

A small minority of the participants in the study uttered a negative attitude toward the game elements. Furthermore, our study shows also that the acceptance of game elements depends on other characteristics such as the urge for achievement and competition. The positive judgment of the gamification elements is in one case correlated to the gamer type of the participant (Achiever to reward points). This shows that not each user may accept gamification elements at the same level. The results also contradict theoretical assignments of game elements to personality types by Ferro et al. (2013). The authors associated the Achiever type with badges whereas we found a relation between Achiever and reward points. These results show that further empirical research is necessary both for the gamification of project management software and for other business information systems.

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