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DEPARTMENT of PSYCHOLOGY

Gamification of Work Tasks: Effects of Mixed and Individual Game Design Elements on Motivation and Performance

Marcel Borgsen

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Supervisor: Camilo Sáenz-Moncaleano

Abstract

Gamification uses elements of game-designing on mundane tasks to enhance motivation and performance. This study aimed to investigate the effects of gamification on performance, intrinsic motivation and amotivation while doing work tasks. Using a randomized experimental design with the game design elements reward badges and character choice, gamification of in-tray exercises commonly used in Assessment Centres as work tasks were explored. In addition, each game design element was investigated. The results showed that character choice and reward badges had a negative effect on intrinsic motivation (F (1, 93) = 12.600, p = <.001) while being positive on amotivation (F (1, 93) = 11.862, p = <.001). Despite the lower levels of intrinsic motivation, gamification still had a positive effect on performance (F (1, 93) = 10.717, p < .001) due to lower amotivation. The results showed that Gamification has the potential to enhance performance in Assessment Centres and therefore the validity of used methods like in-tray exercises. In future studies, the effects on motivation and performance of individual and mixed game design elements with intrinsic and extrinsic motivational aspects should be researched.

Keywords: *Gamification, Game Design Elements, Motivation, Self-Determination, Performance*

Acknowledgments

The work on this thesis led me to deep insights about games and their usefulness besides entertainment. First, I would like to thank my grandmother for playing countless games of card- and board-games almost every time we met. She introduced me to the world of games and got me hooked into them.

Furthermore, I would like to thank my wife, for being a helpful and critical part of this thesis (and my life). Also, I am thankful for my child for giving me daily insights on the importance of play and games in the development of humans.

Especially, I would like to thank my supervisor for helping me find the right direction in the rollercoaster of motivation and performance in this master thesis. Lastly, I like to thank my alumni for their help and emotional support, as well as the volunteers and participants for helping to give more insights.

“The opposite of play is not work; it is depression.”

Brian Sutton-Smith

Gamification of Work Tasks: Effects of Mixed and Individual Game Design Elements on Motivation and Performance

This study aimed to explore the effects of implementing gamification using mixed and individual game design elements on work tasks. Underlying theoretical implications were used to set up an experimental design with the aim to make mundane tasks more appealing through gamification. Therefore, performance and motivation were measured while performing in-tray exercises as work tasks, which are widely used for candidate potential assessment in work life.

Gamification

Even though the definition of the complex subject is broadly discussed in research (Landers et al., 2018), *gamification* is widely acknowledged as the use of game-design elements in non-gaming contexts with a desired outcome (Deterding et al., 2011; Liu et al., 2017; Schöbel et al., 2019). Motivational aspects of game design elements are implemented on mundane tasks in order to make them more appealing and fun, therefore more engaging to perform (Deterding et al., 2011; Domínguez et al., 2013). Moreover, the use of a suitable mix of game design elements has been found to promote enhanced engagement and motivation (Landers, Tondello, et al., 2019).

Gamification in a lexical meaning is the integration of game elements into objects which are *gameless* to produce *gameful* characteristics. Gamification can evoke a *gameful* reality, where individuals feel *gamefulness* in their daily life (Yohannis et al., 2014). By using game design elements to interact with a gamified interaction system, users can have a *gameful* experience (Landers, Tondello, et al., 2019). However, a *gameful* experience is widely debated in research and needs to be more defined. For example, Deterding and colleagues (2011) states that there is a common misconception between *gamefulness* and playfulness,

which should be seen as two distinct constructs. According to these authors, play can be seen as unstructured and free behaviours, whereas games have rules and objectives. Nevertheless, for the purpose of this study, gamification is defined as creating a *gameful* experience using elements of game designing on a *non-gameful* context.

Trend Gamification

Gamification has gained an incremental trend in software development in the last decade (Baptista & Oliveira, 2019). Game design elements from (video-)games were integrated in serious software designs and used to engage people into interacting more with the software (Morschheuser et al., 2018). However, Gamification has also become a common buzzword in research and work life, and is associated with mixed effects on motivation and performance (Faust, 2021). Nevertheless, scholars and practitioners continue to show interest in gamification as a tool for promoting performance and health (Jahn et al., 2021). As a widely adopted concept in human-computer interaction, gamification is becoming increasingly prevalent in our daily lives and is expected to be utilized more in the future (Mazarakis, 2021). Additionally, the usage of game design elements in form of gamification is already widely distributed into our present life, sometimes even unrecognized. For instance, the Stockholm *piano staircase* is an example of how a fun element can be used to motivate people to use stairs instead of elevators. By turning the stairs in a subway station into a giant piano that played music as people stepped on them, the intervention led to a 66% increase in people taking the stairs over the elevators (Dias, 2017; Kim, 2015). Furthermore, the relevance of gamification in the business world is increasing, with an estimated global market size of 58.8 billion USD expected by 2028. The Covid-19 pandemic, which has led to an increase in remote work and spatial distance, has also accelerated the use of gamification

software as a means of keeping employees motivated and performing (Research and Markets, 2022).

Positive effects of gamification on humans are uniting engagement and functionality for tasks (Morschheuser et al., 2017), enhancing productivity in combination with satisfactory (Rajanen & Rajanen, 2017), enhancing usability (Saha et al., 2012), designing more enjoyable experiences (Liu et al., 2017), driving behaviours (Rodrigues et al., 2016), and resulting in a positive business impact (Morschheuser et al., 2015). Gamification is being applied in a variety of areas such as learning (Legaki et al., 2020); work life (Arai et al., 2014; Fernandes et al., 2012) and health (Lister et al., 2014).

Even though gamification is widely associated in research and business with positive effects on performance and motivation, still the results of a vast of studies showed mixed effects. For instance, a meta-analysis on gamification showed that the effect sizes on increasing motivation and performance are small (Sailer & Homner, 2020). Poor execution of gamification design can also lead to negative outcomes on performance and motivation (Loughrey & O´ Broin, 2018; Toda et al., 2018), and as many as 80% of gamification implementations in workplaces miss their business objectives due to poor design (Kumar, 2013). Overuse of gamification could lead to fatigue, while repetitiveness within a gamified system could decrease users' desire to complete tasks (Hanus & Fox, 2015). In conclusion, although gamification is a popular and trending concept in many areas of life, the effects and usage need to be more thoroughly researched in order to fully leverage the potential as a motivational tool for performance.

Game Design Elements

The design and implementation of game elements are crucial to successful gamification applications (Deterding et al., 2011). Widely used game design elements in

gamification applications are: avatars, ranks, leader boards, levels, point systems, competition and challenges, narrative, badges, among others (Deterding et al., 2011; Landers et al., 2018). There is a variety of research and discussion when it comes to the functionality of individual game design elements. For example, badges, points and leaderboards can evolve intrinsic and extrinsic motivational aspects (Mekler et al., 2017) while other game design elements can have the functionality to enhance performance by attractive competition (Zainuddin et al., 2020). The present study focuses on two game design elements: (*reward) badges* and *avatars* (in the form of *character selection*). Badges are used to design the game interface; to make progress and achievements visible; and to make users gain them based on successful interaction with the gamified system (Deterding et al., 2011; Sailer et al., 2017). Avatars are a self-representation of the user in gamified systems. They could either be self-created or a choice of templates; three dimensional or two dimensional; with high resolution graphic or pictograms. Avatars give the user impression to be part of the game and the narrative (Sailer et al., 2017).

Gamified Motivation

Gamified systems are developed to meet various psychological needs and increase motivation, particularly by enhancing intrinsic motives (Deterding, 2015). In order to promote sustained productivity, gamified systems should aim to foster intrinsic motivation (Nicholson, 2015). Consequently, the present study focuses on Self-Determination Theory (SDT) as one of the most researched within motivational theories (Ryan & Deci, 2000).

SDT emphasizes the significance of human needs in developing inner resources for personal growth and self-regulation of one's behaviour. It encompasses intrinsic and extrinsic motivation as well as the opposite of motivation, amotivation (Deci & Ryan, 2012). Rather than considering motivation as a single construct, SDT highlights its complexity, comprising

multiple individual aspects that work simultaneously (Deci & Ryan, 2012). SDT also provides a more personalized view of task performance. For instance, individuals may be driven to perform a task due to internalized or externalized motives that are often intertwined (Deci & Ryan, 2012). The theory identifies three fundamental human needs - competence, autonomy, and relatedness - which explain motivation to perform. When these needs are satisfied, it results in higher motivation to perform a task, and the degree to which each need is met correlates with the level of intrinsic motivation for completing the task (Deci & Ryan, 2012). On the other hand, amotivation is the converse of motivation, characterized by a decreased drive to perform a task and a reduced sense of its meaningfulness to the individual (Deci & Ryan, 2012). Amotivation reflects a general absence of motivation to accomplish certain tasks and is therefore seen as the contrary to motivation (Ryan & Deci, 2000). Nevertheless, SDT as a motivational concept for gamification still needs research to explain the different effects (Schöbel et al., 2016), even though motivation through gamification within the context of SDT is widely researched (Zainuddin et al., 2020).

To sum up, gamified systems should address to the basic three needs of SDT and reduce amotivation. For instance, fulfilling the need for *autonomy* can be achieved by offering individuals the freedom to choose how and when to use the gamified system, as well as providing options and choices within the system (Tondello et al., 2019). *Relatedness* is often connected to task meaningfulness, fulfilled mostly through a narrative or a meaningful story behind the tasks in order to engage individuals interacting with a gamified system (Nicholson, 2015; Sailer et al., 2017). *Competence*, on the other hand, can be met by enabling individuals to master a particular task or skill through challenges and visual achievements, as well as offering opportunities for growth through those challenges (Tondello et al., 2019). However, cautious usage of extrinsic cues must be applied in order to not base the motivation mainly on external motivation (Ryan & Deci, 2000).

In conclusion, incorporating game design elements into tasks must prioritize the fulfilment of the basic motivational needs according to SDT to enhance intrinsic motivation as well as decrease amotivation (Landers et al., 2019; Sailer et al., 2017).

Aim of the Thesis

Learning with gamified elements is a well-researched area within gamification (Perryer et al., 2016), but research on implementing gamification in work and business contexts is still limited (Faust, 2021). Moreover, there is ongoing debate surrounding the complexity and effectiveness of gamification, and further research is needed to better understand the effects of different game design elements (Rapp, 2017; Robson et al., 2015). Lastly, while a considerable amount of research has been conducted under experimental conditions involving numerous game design elements, there has been limited analysis of the effects of individual game design elements (Mazarakis, 2021).

As a conclusion of these stated research gaps and the different results in prior research on the ideal mixture of game design elements to enhance motivation and performance (Faust, 2021; Loughrey & O´ Broin, 2018; Toda et al., 2018) the aim of the thesis was to explain how the game design elements affects intrinsic motivation while performing work tasks. Furthermore, a potential decrease in amotivation in interacting with the created gamified system was researched. The objective behind the designed gamification process was to make the work tasks more fun and engaging. Additionally, to gain a better understanding of the effects of different game design elements character choice and reward badges, each element was analyzed individually to determine their impact on motivation and performance.

To achieve these objectives, an experimental design was developed with various experimental conditions to compare the effects of individual game design elements as well as their combination. Moreover, pre- and post-measurements of intrinsic motivation were

employed to better comprehend the isolated effects of reward badges on motivation and amotivation. The hypotheses tested to achieve the thesis goal are as follows:

The concept of SDT (Deci & Ryan, 2012; Faust, 2021) was used to explain the motivation to perform tasks, and it is expected that using gamification to fulfil the three basic needs of autonomy, competence, and relatedness while performing work tasks will increase intrinsic motivation. Therefore, the first hypothesis (H1) states that intrinsic motivation will be higher in all gamified conditions compared to the control condition. Further on, the pre- and post-measurement of intrinsic motivation should differ when reward badges are used since this element is presented to participants after the pre-measurement (see Method section).

Due to the mixture of game design elements used, it is also expected that amotivation will decrease in the experimental conditions. Previous research suggests that intrinsic motivation has a reciprocal effect on amotivation (Ryan & Deci, 2000), conclusively by using a gamified system, it is expected that while intrinsic motivation is enhanced, amotivation should be decreased. Therefore, the second hypothesis (H2) states that amotivation will be lower in all gamified conditions compared to the control condition. Additionally, when reward badges are used the pre- and post-measurement of amotivation should differ.

Furthermore, an increase in intrinsic motivation to interact with the system and the tasks could be beneficial for performance (Mitchell et al., 2020). As a result, it is expected that the performance score will be higher in the experimental conditions that use game design elements. Thus, the third hypothesis (H3) states that the performance score will be higher in all gamified conditions than in the control condition.

To explore the effects of the individual game design elements used in this experiment, it is also expected that intrinsic motivation and performance will be higher, as well as amotivation lower in the gamified condition with the mixture of reward badges and character

choice than in the other experimental conditions that use only one game design element, such as character choice or reward badges.

Method

This study utilized a randomized experimental design, which included a total of four conditions. The control condition lacked game design elements, while the experimental conditions varied in their use of game design elements. The first experimental condition incorporated all of the game design elements, including reward badges and character choices. The second experimental condition included the game design element of character choice, and the third experimental condition included the game design element of reward badges.

Therefore, the independent variable, gamification, was defined by mixed or individual two types of game design elements: character choice and reward badges. The dependent variables included intrinsic motivation and amotivation to perform the work tasks, as well as the performance score of the work tasks.

Participants

The data collection took place between the 23/11-2022 and ended at 20/02-2023 with in total (N = 100) participants. Substantial English knowledge was an inclusion criterion and all participants stated that they were at least mostly fluent in the English language. Five participants had to be removed due to not completing the surveys. The remaining sample (n = 95) was randomly assigned to the four conditions: control condition with (n = 32), experimental condition using all game design elements (n = 20), experimental condition using only character choice (n = 21) and the experimental condition using only reward badges (n = 22). The participants had an occupation mostly as students (62,1%); followed by office worker (7,4%); healthcare worker (5,3%); manager (4,2%); and production worker (2,1%),

the rest stated different or multiple occupations (18,9%). The age of the participants ranges from 19 to 61 (M = 26.96, SD = 7.82). In this study 68 female, 24 male and 3 others/not stated participated. Most participants have a British nationality (34,7%); followed by a German nationality (9,5%), the rest of the participants have various nationalities (55,8%). An a priori power analysis using the software tool G*Power version 3.1 was conducted (Faul et al., 2007, 2009), which resulted in a needed sample size of 76. Hence, the reached sample size of 95 participants reached a power level of .91 for the conducted single factor analysis of variance (ANOVA).

Materials and Instruments

Motivation

In the experimental and control conditions the *Situational Motivation Scale* (SIMS) (Guay et al., 2000) was given as a pre- and post-measure in order to see differences in the intrinsic motivation and amotivation before and after performing on the in-tray exercises. This scale was constructed based on the SDT to measure situational motivation. This scale is measuring four factors of motivation; in this study a subscale with the two factors intrinsic motivation (α=.69), and amotivation (α=.85) was used. In total there are eight items used on a 7- point Likert scale with four items representing each factor. For example, some items are “I don’t know; I don’t see what this exercise brings me” or “Because I believe that this exercise is important for me” with the answer ranging from “corresponds not at all” to “corresponds exactly” (Guay et al., 2000). Since this experiment reflected a short, simulated work situation, this scale was chosen over more global motivational measures. In addition, this scale has been revalidated several times (Lonsdale et al., 2011; Østerlie et al., 2019). In order to fit the wording of this scale, the future and past tense were used to direct the participant describing the own situational motivation before and after performing on the work tasks. The resulted

internal consistency of the questionnaire in this study was very good, with Cronbach's alpha = .94.

Performance

In organizational and workplace settings, Assessment Centres (AC) are commonly used to evaluate the job potential of potential candidates (Obermann, 2018). AC methods often involve behaviour simulations tailored to the specific job, where candidates are placed in situations that mimic the role they are applying for. One of the most commonly used behaviour simulations is *in-tray exercises*, where candidates take on the role of a specific position and make decisions or complete tasks based on incoming messages (Obermann, 2018). Therefore, in this study performance was measured using in-tray exercises as work tasks consisting of eight questions, with three multiple-choice answers, one of which was correct. In-tray exercises, like other single tests in AC have been seen as a moderate valid measure (r = .16) for estimating job performance (Whetzel et al., 2014). The in-tray exercises used in this study were obtained from the University of Leeds Career Centre website and were supplied to them by KPMG (University of Leeds, 2022). This is a practical exercise for students to prepare for potential upcoming AC in their careers and is not a validated instrument. However, due to the time limits of an online survey with 15-20 minutes as a time goal for each participation; these exercises was chosen over validated measures used in AC, since their usual time goal lies between 30 to 90 minutes (Obermann, 2018).

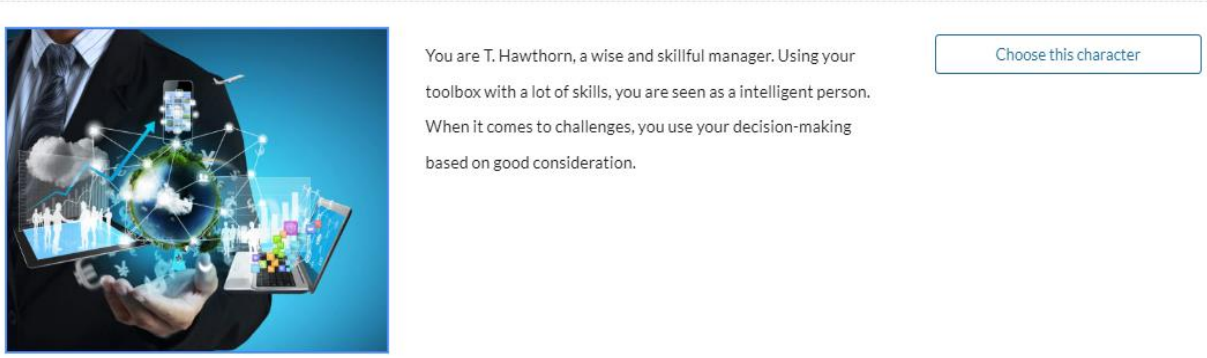
Character Choice

The participants were able to choose a character, which fits the business narrative of the work tasks in form of in-tray exercises. Three characters were developed, each with unique abilities and values described by a brief text. Participants were required to select a

character that they believed best reflected their self-perception. The used in-tray exercises as work tasks already had a narrative implemented. This game design element creates therefore a linked context to the work tasks. Here, the narratives have the potential to enhance the participants intrinsic motivation as well as motivating to interact with the gamified system (Nicholson, 2015; Tondello et al., 2019). Also, previous research showed that avatars are capable of satisfying the need of autonomy and relatedness (Mekler et al., 2017; Sailer et al., 2017). Figure 1 shows an example of a character:

Figure 1

Example character of the game design element character choice



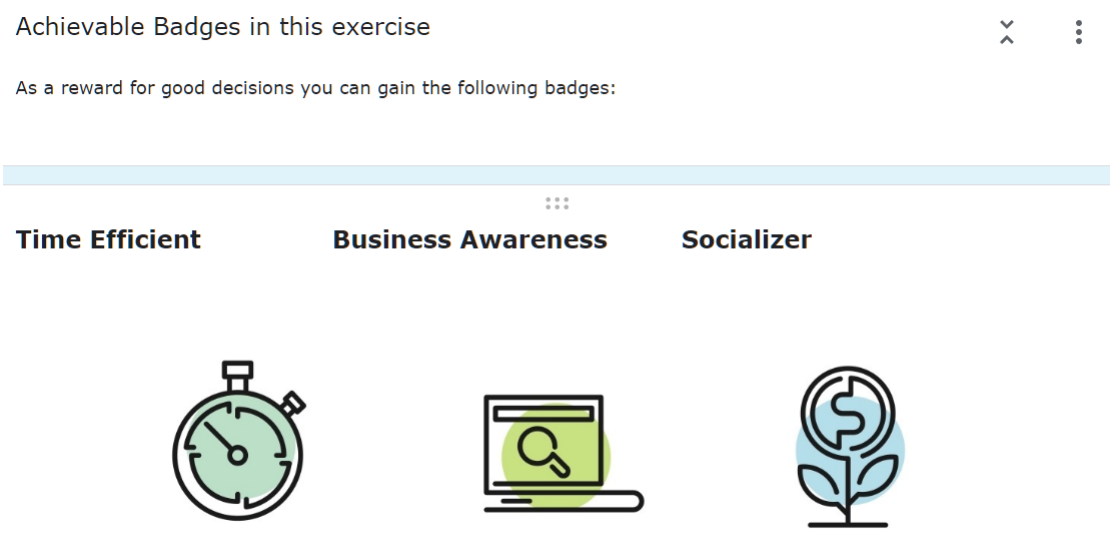
Reward Badges

By implementing reward badges in the gamification design, one key feature of games with challenges is used for the participants. Competition can have both positive and negative impact on intrinsic motivation (Höllig et al., 2020). Based on own mastery, competition has a more positive effect than competition between others (Tondello et al., 2019). Previous research showed that badges are suitable to satisfy the need of competence (Mekler et al., 2017; Sailer et al., 2017). In conclusion, achievements in the gamified system through badges were installed. Here, the achievable badges were presented to all participants before the work tasks to motivate achieving them. In total, three achievable badges were shown after every

two tasks and the total achieved badges were shown after finishing the exercise. The badges were related to the narrative of the exercises as well as a reward given by the boss or department manager. To compare the effects of badge achievement and make them comparable between conditions, all participants were awarded badges, even if they provided incorrect answers. Figure 2 depicts the achievable reward badges.

Figure 2

Overview of the game design element reward badges



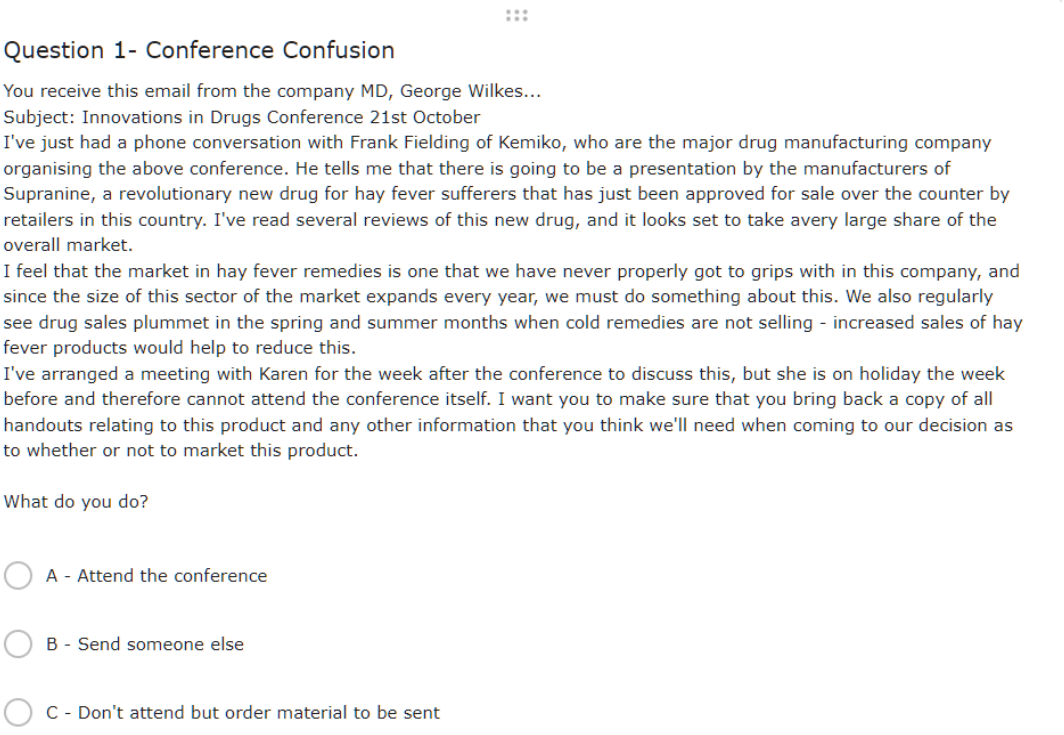
Procedure

To reach the aim of this thesis, an experimental design utilizing an online survey and tasks was selected. The measures, materials, and gamified system were created using a combination of Google Forms and Google Sites. Randomization of the participants was achieved using random link allocation (Fergusson, 2016) between the different conditions of this experiment. The first step in achieving the objective of this study was to establish a control condition as a basis for the experiment. By creating and adding the game design elements the experimental conditions were set up.

The experiment was divided into three main segments. The first segment included obtaining informed consent for participation and a demographic survey, together with the motivational survey (SIMS) specific to this situation. The second segment comprised work tasks that all participants had to perform in both the control and experimental conditions. These work tasks were in-tray exercises commonly used in AC. Here, after an introduction into the role as a manager the participants had to make appropriate choices on fictional incoming messages and letters by selecting from multiple-choice answers. The in-tray exercises consisted of eight partially interrelated questions, which participants could revisit and review. An example of an in-tray exercise question is provided in Figure 3:

Figure 3

Example question of the in-tray exercises



The third segment of the experiment involved administering the same motivational scale (SIMS) as a post-measure, along with questions about gaming experience and

preferences. The experiment in the control condition was designed to last 15-20 Minutes, while the experimental condition designed to last 16-25 minutes per participant.

Prior to the experiment, a pilot was conducted with four volunteers to assess the usability of the survey and different experimental groups. The feedback of these volunteers was used to enhance usability and clarity of the exercises and forms, as well as to reach the time goal. A participant recruitment via social media platforms like Reddit, Facebook, LinkedIn, and other platforms was conducted. The internet link to the experiment was shareable from the participants to other people to gain more participation.

In order to control for priming effects related to gamification or gaming stereotypes, the experiment utilized deception about its true purpose. The informed consent and social media advertisement stated that the experiment was testing skills related to AC preparation. While no compensation was given, participants were able to see their performance results immediately. The target group for the experiment was individuals who were 18 years or older and fluent in English.

The ethical guidelines for conducting scientific psychological research were followed, with no psychological or physical harm expected. Participation was completely voluntary, with the option to not answer any questions or complete any tasks. The informed consent explicitly stated these ethical principles.

Data Analysis

Data Analysis was conducted using IBM SPSS Version 28. An alpha level of .05 was used as a threshold for significance in all performed statistical tests. To analyse the effects of the different experimental conditions on motivation and performance one-way ANOVAs were conducted, as wells post hoc tests Tukey or Games Howell were calculated afterwards. Before calculating the results, the pre-conditions of the used ANOVA were checked.

All of the dependent variables had no extreme outliers. However, when assessing the assumption of normally distribution by the Shapiro-Wilk test (p =<.05), the dependent variables performance score and amotivation as pre- and post-measurement were not normally distributed for the experimental conditions, while the control condition was normally distributed. Since a one-way ANOVA showed robustness against this assumption, the data was still used for the conducted statistical calculations. As assessed by Levene's test, there was homogeneity of the error variances for the performance scores, intrinsic motivation pre-measurement and post-measurement and amotivation pre-measurement (p > .05), but not for amotivation post measurement (p = .037).

Results

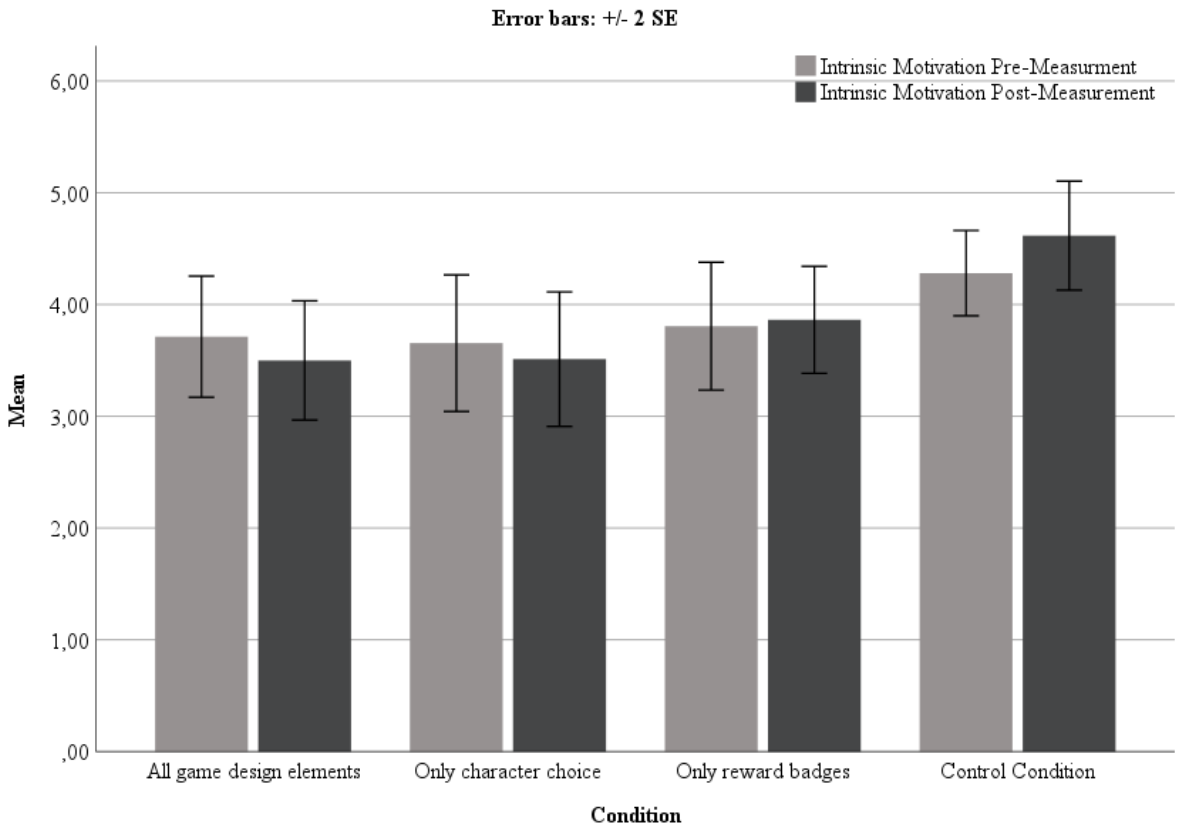
The participants demographics age, gender, working occupation (e.g. student, manager, office-worker, etc.) and previous gaming experience (PC games, console games, etc.) were checked for significant effects on intrinsic motivation, amotivation and performance score, with the result that there are no significant differences.

Intrinsic Motivation

Intrinsic motivation results showed that in the pre- and post-measurement, the condition with the highest mean score was the control condition, followed by the experimental condition using only the reward badges, the experimental condition using all game design elements and lastly, the experimental condition using only character choice (see Figure 4).

Figure 4

Overview of the mean scores of intrinsic motivation per condition.



Results of a one-way ANOVA showed that, contrary to what was expected in H1, the combined experimental conditions had a lower score in intrinsic motivation pre-measurement (*M* = 3.72, *SD* =1.30) compared to the control condition (*M* = 4.28, *SD* = 1.08), this difference was statistically significant (*F* (1, 93) = 4.307, *p* = .041). Likewise, contrary to what was expected for the post-measurement, the control group (*M* = 4.62, *SD* = 1.38) had a significantly higher level of intrinsic motivation than the experimental group (*M* = 3.63, *SD* =1.37; *F* (1, 93) = 12.600, *p* = <.001).

A one-way ANOVA with Games-Howell post hoc tests was conducted to compare intrinsic motivation among the four conditions. The pre-measurement of intrinsic motivation did not differ significantly among the conditions (*F* (3,91) = 1.462, *p* = .230), Consequently, post hoc analysis using Games-Howell tests showed that all conditions had similar values of intrinsic motivation with no significant differences between the groups. On the other hand, the

post-measurement did show a significant difference (F (3,91) = 7.491, p = .005). Further on Games-Howell post hoc tests showed that the control condition had higher levels of intrinsic motivation (M = 4.62, SD = 1.38) after the work tasks in comparison to the experimental condition using all game design elements (M = 3.50, SD = 1.19; M_{Diff} = 1.12, 95%-CI [.16, 2.07]; p = .016), and the experimental condition using only character choice (M = 3.51, SD = 1.38, M_{Diff} = 1.11, 95%-CI [.07, 2.14]; p = .032). All other comparisons between the conditions were not significant.

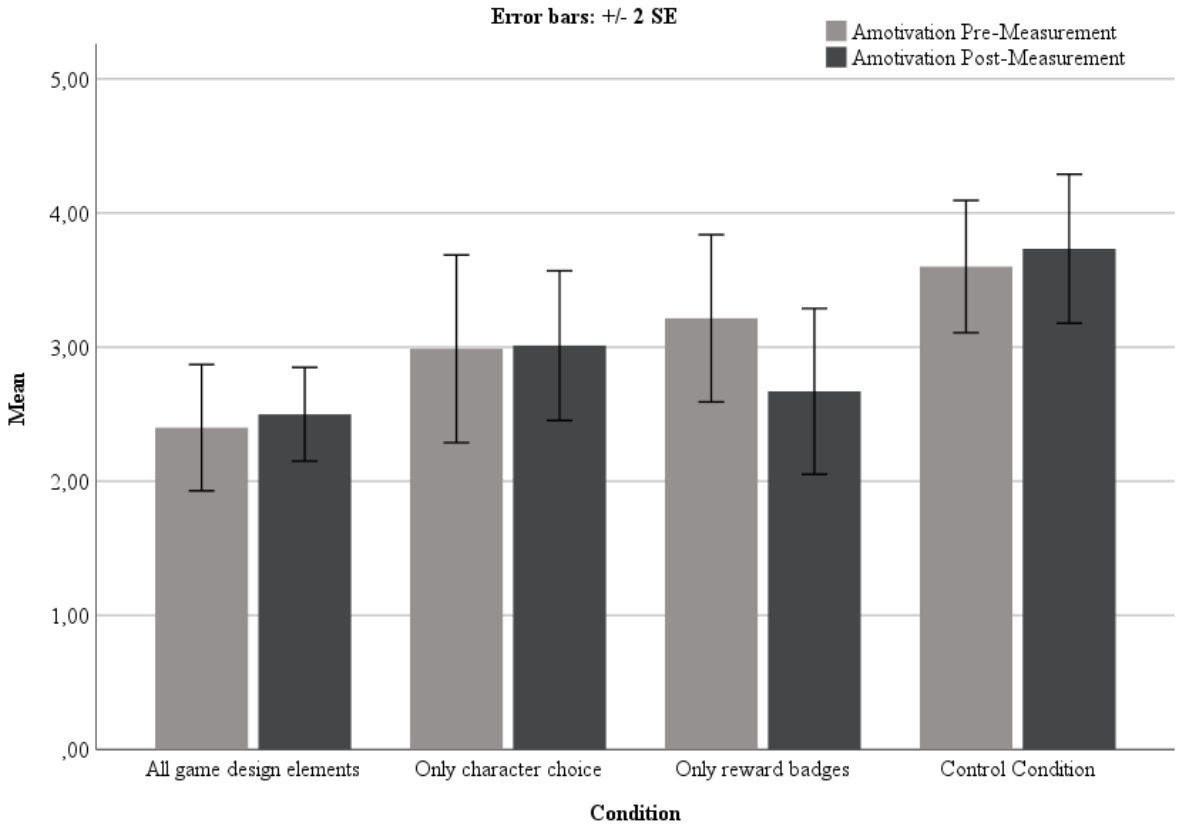
Lastly, to further explore differences between the pre-and post-measurements, paired *t*-tests were conducted for within-group differences of pre- and post-measurements in every condition, the results showed no significant differences for intrinsic motivation.

Amotivation

For amotivation in the pre-test, the lowest mean score was observed in the condition using all game design elements, followed by the condition using only character choice and the experimental condition using only the reward badges. Here the control condition reached the highest amount of amotivation. This goes in line with the results of the amotivation post-measurement, except of the condition using only the reward badges. Figure 5 shows an overview of the reached mean scores for amotivation.

Figure 5

Overview of the mean scores of amotivation per condition



There was a significant lower score of amotivation pre-measurement for the combined experimental conditions (*M* = 2.88, *SD* =1.42) compared to the control condition (*M* = 3.60, *SD* = 1.40; *F* (1, 93) = 5.537, *p* = <.05). For the amotivation post-measurement, the combined experimental conditions had a significantly lower level of amotivation (*M* = 2.73, *SD* =1.21) when compared to the control condition (*M* = 3.73, *SD* = 1.57; *F* (1, 93) = 11.862, *p* = <.001).

Further difference in the results were tested using a one-way ANOVA with Games Howell or Tukey post hoc tests to compare amotivation among all conditions. There is a significant difference for amotivation pre-measurement between all of the conditions (*F* (3,91) = 3.132, *p* = .029), as well as amotivation post-measurement (*F* 3,91 = 4.451, *p* = .006). Further Games Howell post hoc tests showed that participants scored a significant lower level for the amotivation pre-measurement in the experimental condition using all game

design elements (*M* = 2.40, *SD* = 1.05) compared to the control condition (*M* = 3.60, *SD* = 1.40; M_{Diff} = 1.20, 95%-CI [.29, 2.11]; *p* = .005). Likewise, that in the amotivation post-measurement a similar result was obtained, here the control condition (*M* = 3.07, *SD* = 1. 42) had a significant higher amount of amotivation compared to the condition using all game design elements condition (*M* = 2.50, *SD* = .78; M_{Diff} = 1.23, 95%-CI [.36, 2.11]; *p* = .003). Tukey post hoc tests were used for amotivation post-measurement since there was no homogeneity of error variances for this variable.

Additionally, as for intrinsic motivation paired *t*-tests showed that there are no significant differences for amotivation between pre- and post-measurement.

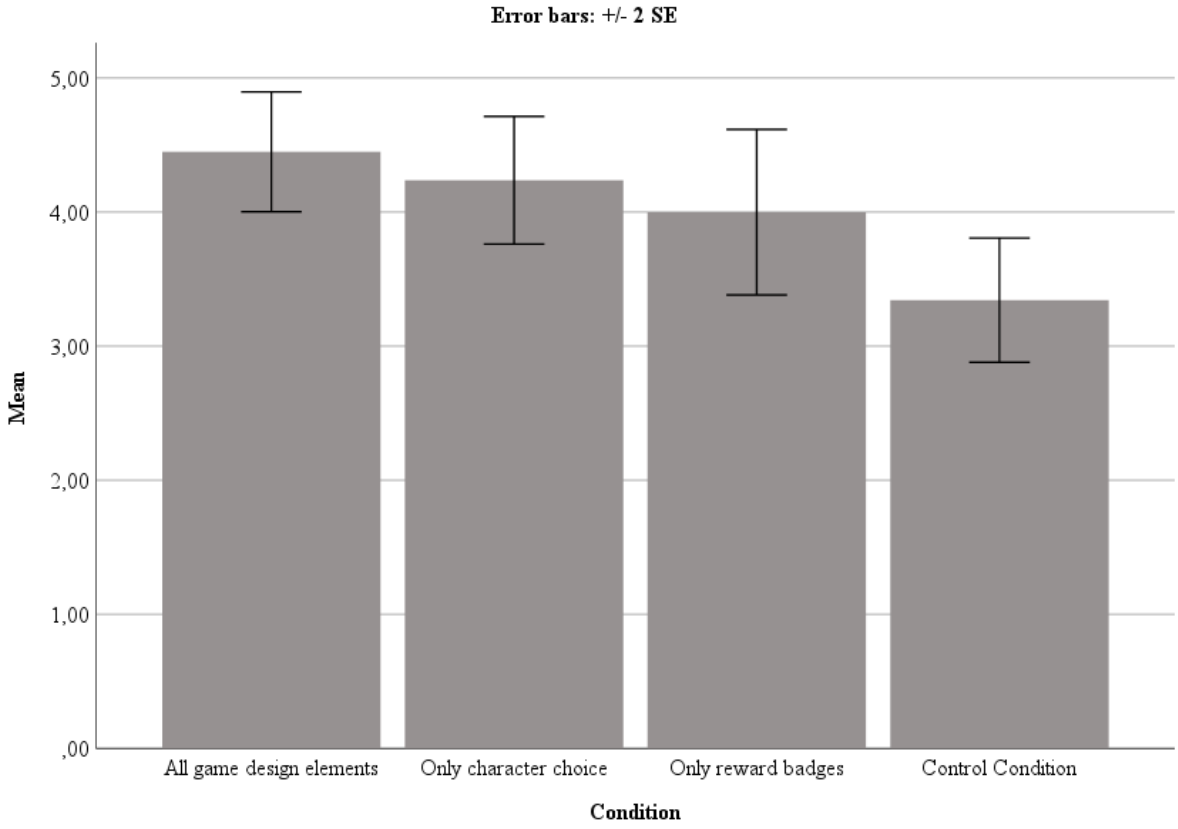
Performance

Performance results showed a significantly higher score for the combined experimental conditions using gamification (*M* = 4.22 *SD* = 1.20) compared to the control condition, which are solving the work tasks without gamification (*M* = 3.34, *SD* = 1.31; *F* (1, 93) = 10.717, *p* < .001).

Further differences were tested using a one-way ANOVA with post hoc tests Games Howell to show differences of performance score between the experimental conditions and control condition. There is a significant difference for performance score between all of the conditions (*F* (3,91) = 4.010, *p* = .010). The further post hoc Test Games Howell showed a significant difference between the condition using all game design elements (*M* = 4.45, *SD* =.10) and the control condition (*M* = 3.34, *SD* = 1.31, M_{Diff} = 1.11, 95%-CI [.25, 1.96]; *p* = .006). Figure 5 provides an overview of the resulted performance score means in the different conditions.

Figure 5

Overview on the mean scores of performance per condition



Discussion

In this study, individuals who completed work tasks while being exposed to gamification had statistically significant better performance. However, contrary to what was expected, they had a lower score of intrinsic motivation in comparison to the group without gamification, both in the pre- and post-measurements. These findings contradict the hypothesized impact of gamification on intrinsic motivation. Furthermore, as expected the experimental group displayed lower levels of amotivation compared to the control group. However, this also contradicts the expectations of amotivation related to intrinsic motivation, since amotivation is defined as lack of motivation to perform tasks. These results suggest that

it is important to evaluate and distinct whether gamified systems are evoking intrinsic or extrinsic motivation. Additionally, the impact of gamification on motivation and performance in work tasks depends on the specific game design elements and their design and combination.

Motivation through Game Design

The use of gamification in the experimental conditions led to significantly lower scores of reported intrinsic motivation compared to the non-gamification condition. The inclusion of the chosen game design elements character choice and reward badges had a negative impact on participants' self-motivation. With a further look on the post hoc tests, the use of character choice resulted in significantly lower levels of intrinsic motivation in the post-measurement compared to the control condition.

A possible explanation for these results could be that the characters presented were not aligned with participants' self-perception. In this study, participants were offered a limited selection of three given characters without self-creation possibilities. Additionally, it was found that most participants mostly choose one character, possibly indicating a dislike for the others. Therefore, the character pictures and character description texts could be mostly different from the self-perception of the participants. However, the limited character choices did not satisfy the participants' need for autonomy and relatedness of SDT, leading to the lower intrinsic motivation outcomes.

For instance, the contrary was shown in another experiment using a gamification process for an online simulation. By implementing a limited selection of avatars, a meaningful story, and teammates, the need for autonomy and relatedness was fulfilled (Sailer et al., 2017). However, the authors also concluded that the users did not perceive a higher degree of freedom of choice within the gamified system, suggesting that this game design

element needs to be creatively utilized by the user to be viewed as a personal representation. Previous research has shown that personalized avatars lead to greater engagement and attachment (Suh et al., 2011), and personalization is an effective principle for gamification as users are better able to receive and experience it (Liu et al., 2017). Therefore, aside of creating a better character choice fitting the self-perception of participants, allowing participants creating a customizable avatar could have resulted in better outcomes on intrinsic motivation.

The game design element of reward badges did not have a significant impact on intrinsic motivation as well, as revealed by the lack of differences in pre- and post-measurements of motivational levels. This indicates that the badges used in this experiment did not fulfil the need for relatedness and competence as described by SDT. These findings are inconsistent with previous research, which found that badges, leader boards, and performance graphs in an online simulation can fulfil the need for competence and contribute to the meaningfulness of tasks (Sailer et al., 2017).

However, participants in this study were uncertain about how to earn the badges, which may have resulted in insufficient clarity and usefulness of this game design element, making it difficult for participants to evaluate their own performance accurately. Further on, previous literature suggests that badges, which are not tied to the narrative and are mandatory to earn, may not effectively enhance motivation (Werbach & Hunter, 2015). Although the reward badges used in this study were appropriate for the given business context, the use of more context-dependent badges for specific tasks may have been more effective in improving task meaningfulness and therefore intrinsic motivation through this game design element.

Another possible explanation for the results is that participants may have differing preferences as suggested by previous research. The impact of game design elements on motivation and performance varies among individuals due to differences in their preferences and perceptions of such elements (Schöbel et al., 2016). For instance, some individuals may

not enjoy selecting a character or may prefer a different one that was not provided in the experiment. Likewise, some participants may not perceive reward badges as a desirable form of feedback and would instead prefer personalized feedback on their performance or a different set of badges that better match their individual preferences.

Performance through Gamification

Despite the chosen game design elements were not meeting the expectations regarding their impact on intrinsic motivation, the experimental groups still demonstrated significantly better performance compared to the control group. This indicates that the gamification design itself had an influence on performance. One reason for this result is that amotivation was lower in the gamified conditions than in the control condition. Amotivation can reduce performance by decreasing willingness to complete a task (Ryan & Deci, 2000), which was not the case when gamification was applied. The detailed results on amotivation showed that the experimental group, which used all game design elements, had significantly lower levels of amotivation compared to the control group. It appears that the combination of game design elements was successful in decreasing amotivation, thus contributing to the enhanced performance of the gamified conditions in this study.

Another explanation to these results is that amotivation could also be lower in the gamified conditions than in the control condition due to the novelty effect of the introduced game design elements. Like in games for entertainment purposes, discovering and getting familiar with new mechanics and contents have effects on performance and motivation, the novelty effect occurs when game design elements and contents are introduced (L. Rodrigues et al., 2022; Seaborn & Fels, 2015). Rodrigues and colleagues (2022) found that, gamification follows a u-pattern, where motivation and performance is the highest when introduced and the lowest after some time, with a rise again when individuals get familiar with the game design

elements. This study used a deception about the purpose of it and the introduced game design elements were therefore completely unexpected and novel for the participants, which could therefore decreased the unwillingness to perform the tasks.

To sum up, the results indicated that the process of gamification decreased intrinsic motivation and amotivation, but also improved performance. The gamification process helped to make mundane tasks more fun and appealing according to previous research (Deterding et al., 2011; Domínguez et al., 2013). However, other motivational factors may also have influenced the participants, such as extrinsic motivation, which aligns with previous research. For example, extrinsic motivational factors of the participants might be the underlying factors for motivation and performance. In a similar study by Mekler et al. (2017) it was found that, the used game design elements points, leader boards and levels did not affect the need for competence, hence intrinsic motivation. The authors concluded that extrinsic motivational factors had influenced positively the performance rather the intrinsic motives (Mekler et al., 2017). This could be indicating that by adding extrinsic cues like reward badges and/or the character choice used in this study, extrinsic motivational factors could have influenced the outcomes on intrinsic motivation, amotivation and performance.

Despite the importance of enhancing intrinsic motivation for long-term motivation using gamification as a tool for psychological need satisfaction as noted by SDT (Schöbel et al., 2016), it is essential to consider contextual factors when determining the targeted motivation for a gamified system. As the results of this study showed, gamification can lead to better performance for short-term work tasks. This suggests that intrinsic motivation may not be necessary for improving performance in such situations, particularly for tasks that can be quickly completed. This finding could be especially relevant for work environments, where employees are required to complete different short-term tasks each day and should be further researched.

Limitations

This study contributes to more insights about the designing and usage of game design elements while individuals perform work tasks. Still, there are limitations to the chosen approach. The study is cross sectional and conducted in a short time span. The usage of an online survey may have influenced the performance of the chosen AC method, as well as the motivation. A personal AC as a laboratory experimental design could have evoked other results, due to possibility to control for environmental variables, like for instance quiet surroundings and having the same device and materials for every participant.

The in-tray exercises are not validated and should be therefore seen as exploratory results on performance. Other more validated instruments may yield more differences and measure performance more clearly, since also the length with 30 to 90 minutes of in-tray exercises is usually higher (Obermann, 2018). Still all the participants got the same tasks, and the time goal was reached for conducting an online survey. Furthermore, a limit to this study is that the used in-tray exercises simulate work tasks aiming for leadership or management positions. One factor that contributes to the engagement of games is their ability to present challenges that players can overcome, leading to a sense of competence and accomplishment (Deterding, 2015; Przybylski et al., 2010). There should be a variety of tasks with different levels of difficulty researched in order to get a full picture of the effects of the used game design approach in this study.

Another limitation of this study are the self-created game design elements. Modern digital games uses game design elements with sophisticated positive feedback in form of audio, visuals and animations (Przybylski et al., 2010). Due to time and budget limits, it was not possible to create or use a software solution with more advanced game design elements like the previously mentioned avatar creation for the participants, or reward badges which creates a visual presentation when achieving them.

In addition to that, the experiment is using a mixture of game design elements and compare it with individual design elements to show differences. However in general, previous research showed that the usage of individual game design elements results in lesser effects on motivation and performance (Landers et al., 2019; Mekler et al., 2017). Additionally, this study lacks a manipulation check to see if the mixed or individual game design elements were perceived by the individuals. Previous research suggests to check if the manipulation was perceived by the participants and therefore the intervention with gamification is actually affecting the tested participants (Sailer et al., 2017).

Another limitation is the used software for creation of the survey. More sophisticated software using state-of-the art game design elements could have yielded different results. In line with that goes the fact, that due to the combination of Google Sites and Google Forms it was only possible for the game design element reward badges to implement a fully separated pre-and post-measurement of the motivational variables for reward badges. Here another software could have included character choice after the pre-measurement as well, however this was not possible with the used software and due to the budget and time planning of a master thesis this approach was chosen.

Future research

Future research should examine both intrinsic and extrinsic motivation when investigating the effects of individual and mixed game design elements. It is important to consider these findings of this study and distinguish clearly between internal, external, or both motivational factors associated with the observed game design elements. A personalized gamification approach should address user preferences, and gamification should be viewed as a system concept where the effects arise from game design features working together. Nevertheless, this study contributed to the scarce literature on gamification of work tasks and

following research could utilize the findings presented to apply the same gamification system into a larger context, for instance a longitudinal study with a more in-depth analysis of the game design elements.

This study also provides some insights on the usage of gamification in AC. Future research should address the enhancement of motivation while performing AC tasks. Gamification has the potential to enhance the precision and differentiation of candidate assessment in terms of performance and motivation.

Lastly, research on individual game design elements could utilize the introduction of new game design elements into a gamified system over time. By adding these elements into a gamified system with distinct time periods more and precise results on the novelty effect and motivational changes could be observed. Consequently, this approach would also lead to more insights about the individual game design element as well as combined game design elements.

Conclusion

This study produced mixed findings. On the one hand, gamification had a positive impact by reducing amotivation and improving performance. On the other hand, gamification had a negative effect on intrinsic motivation. In summary, gamification can be useful in making monotonous tasks more enjoyable, but the results suggest that external motivational factors should be considered when creating a gamified system. To better understand the effects of individual and combined game design elements, future research on motivation through the usage of gamification design should consider both intrinsic and extrinsic motivation. In addition, more research on the effects of gamification used in AC, could lead to more insights on the validity of AC methods like in-tray exercises.

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