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Abstract

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A best practice for gamification in large companies: An extensive study focusing inter-generational acceptance

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Abstract
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Keywords Gamification · Acceptance · Generations · Large-scale Evaluation

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1 Introduction

Gamification, the use of elements from game design to improve user experience and user engagement in non-game contexts [1, 2] like education or health, is on the rise [3]. Although assertions like "90% of employees say gamification makes them more productive at work" or that alone the "The North American gamification industry […] is valued at $2.72 billion" [3] should be interpreted with care, the trend is clear. Another report estimates the global gamification market value in 2021 at $11.9 billion [4].

This enthusiasm is not surprising: increased user engagement surely has numerous benefits, like improved performance and greater user satisfaction [5]. This is especially true for the younger Generations Y and Z who grew up with games and seek meaning or at least joy in their work activities. As predicted in a 2015 paper on the progression of gamification through the Gartner hype cycle [6], gamification is beyond the "trough of disillusionment", moving across the "slope of enlightenment" towards the "plateau of productivity".

Gamification has gained popularity as a tool for motivation and engagement and has drawn attention in many domains, especially education or healthcare, with mostly positive results [7, 8]. Gamification has been used successfully also in many other areas, e.g., trading, insurance, healthcare, dating [9], or in the business context [10]. However, many gamification applications are still focusing on product marketing (like the programs for frequent travelers or shoppers) rather than changing the nature of established work structures and routines. Why do we still see little gamification in everyday work if the benefits are that obvious? We will discuss this in the related work section, where we especially look at some positive exceptions—areas, where gamification is more established: the service industry, especially call-centers, the area of human resources, and recruiting, as well as work related to industrial production.

In this work, we explore how gamification can help to enrich everyday work activities in larger companies, like scheduling meetings or learning about important company regulations. We especially wanted to investigate how different generations look at gamified applications and which gamification elements are most accepted. As Koudal and Chaudhuri [11] point out, already the members of Generation Y are "entrepreneurial by nature, enjoy electronic games, place a high value on innovation, and are comfortable working in teams." We hypothesized that younger persons, especially representatives of Generation Z (people born between 1995–2009), would show a higher affinity towards gamified solutions for work than Generation Y (people born between 1980–1994), who would still be more prone to gamification than Generation X (people born between 1965–1978).

To explore the acceptance of gamification and its constituent elements, we conducted a study encompassing focus group discussions, prototyping of a gamified application, and a large-scale study involving 367 employees from a large company with more than 17,000 employees. While this research is exploratory, aiming to investigate a multitude of aspects ranging from concrete design issues to intergenerational acceptance, we also aim to address two key research questions:

1. What are the preferences of different generations (X, Y, Z) regarding gamification elements in a large-scale business environment?
2. To what extent is gamification application accepted in practice within a large-scale business environment across different generations (X, Y, Z)?

The outcomes of the study, including the proposed design recommendations, should help future designers and developers to gain a deeper understanding of the usage of gamification at workspace.

2 Related work

2.1 Frameworks for gamified applications

In 1996, Bartle developed a model of player types, separating *Achievers*, *Explorers*, *Socializers*, and *Killers*, all requiring different motivation design elements [12]. Although his model is not directly tied to gamification, the model became very influential when developing gamified applications, where motivation is more important than "fun". Built upon Bartle's model, Marczewski proposed a novel player model called "Hexad Framework" [13], expanding the user types to six, which are either motivated by intrinsic (e.g., through self-realization) or extrinsic (e.g., through rewards) motivational factors. For example, the *Free Spirit*, *Achiever*, *Socialiser*, and *Philanthropist* are among the intrinsic types, whereas the *Players* are motivated by rewards and are therefore extrinsically motivated. The sixth player type, *Disruptor*, is motivated by change and wants to destroy the system. This framework acknowledges the diverse motivational needs of users and their significance in gamification design.

Another gamification framework, the Octalysis Framework by Chou [14] rather focuses on the characteristics of the users and defines eight "core drivers" indicating whether a gamified application employs the engaging elements from the following list:

1. Epic Meaning and Calling: the feeling of doing something great.
2. Development and Accomplishment: the will to progress, improve, and ultimately overcome a challenge. Examples are leaderboards or badges.
3. Empowerment of Creativity and Feedback: engage users in creative processes, where they can improve or alter their creations and see the results.
4. Ownership and Possession: designate the feeling of controlling something, resulting in the will to increase or improve it.
5. Social Influence and Relatedness: use social elements to engage the user, for example, companionship and competition.
6. Scarcity and Impatience: point at the desire to possess something rare and exclusive.
7. Unpredictability and Curiosity: create engagement through not knowing what is coming next.
8. Loss and Avoidance: engage the user to avoid something bad happening.

All three frameworks have been used for devising the gamification elements used in the prototype and for discussing them with the focus groups. A more comprehensive literature review on these and additional gamification frameworks is presented by Mora et al. [15]. However, what exactly are gamification elements? While there is no comprehensive list, we will provide some examples.

First of all, gamified applications are significantly different from serious games, which are fully-fledged digital games with an additional goal beyond entertainment [1, 16]. Instead, they selectively incorporate game design elements rather than encompassing the entire gaming experience. While commonly utilized gamification elements include points,

leaderboards, achievements, or badges, additional elements such as progress bars, feedback, rewards, and levels are also employed, albeit to a lesser extent [7, 17]. However, this is only a part of the potential of gamification as already highlighted in the book *"Actionable gamification: beyond points, badges, and leaderboards"* [14]. Noteworthy but still underrepresented elements in gamification applications include customizable avatars and vanity items. Furthermore, as suggested by Korn et al. [18], gamification elements—especially in business contexts—should not only remain purely virtual but also manifest in the real world, e.g., by offering vouchers for reaching certain milestones.

Although surveys generally show positive results for the use of gamification, they also reveal that the gamification approach is not without controversy and attracts some criticism [7, 8]. For instance, a concern was raised that substituting intrinsic rewards with explicit rewards may in the long run potentially diminish work motivation [19]. Similarly, in his blog titled "The downside of gamification" [20], Tracey argues about the negative effect of extrinsic rewards and expresses concerns about the potential for manipulation and exploitation of users. Further discussions emphasize the need for user-centric design in gamified applications to ensure a positive experience for employees [21]. Therefore, the usage of gamification in the workspace must be carefully considered and further studies are required to investigate the needs and preferences of employees.

2.2 Gamified business applications

Although the gamification of business processes beyond marketing is still a relatively new development, there are areas of more intense usage: the service industry, especially call-centers, human resources and recruiting [22], and finally the area of industrial production. In the following, we briefly present interesting work in these areas.

Human resources and recruiting While assessments like intelligence tests or "aptitude tests" [23] have been instruments of selection for decades in human resources departments, especially the younger generation favors more playful approaches to being tested. Korn et al. [24] describe that gamification can be used for recruiting processes by mapping the Person-Environment Fit-model with the Octalysis Framework.

Once these applicants are hired and become employees, they need to be integrated into the company structure. Heimburger et al. [25] investigated how gamification can be utilized to enhance onboarding processes, i.e., to integrate new employees into the company. The results of the study with 98 students and young employees showed that the gamified application was preferred over the non-gamified version.

Production In comparison to many service processes and much "knowledge work" in general, work in production has a considerable advantage: the results can be seen and touched in the real world. Especially in manual production, the gradual change of materials and pre-products towards their goal is a well-structured, sequential process where steps can easily be monitored and incorporated into gamification elements. Thus, it is not surprising that already in 2012, a concept for the gamification of manual production was introduced [26]. This work was continued over several years to optimize gamification for different modalities like Head-Mounted Display versus projection [27, 28], extend the timeframes [29], and develop adequate designs [30, 31].

While this line of work was focused on assembly in general, another ideal candidate for gamification of production is the automotive industry: starting in 2016, both Korn et al.

[32] and Lee et al. [33] describe concepts for integrating gamification elements into the production of cars. Indeed, these advances have been put into practice at car manufacturers like BMW, where Werrlich describes gamified assembly processes featuring a robotic assistant called "Embly" [34]. This work already indicates the growing importance of agents who provide a "face" for gamified feedback. Grund et al. [35] show how important it is to take the preferences of workers seriously when designing an agent. This is even more true if this agent also has to provide negative feedback [36], which happens if errors occur in production.

Services Huotari and Hamari [37] define service-oriented gamification as "a process of enhancing a service with affordances for gameful experiences to support user's overall value creation". As Korn and Schmidt [6] already stated in 2015, "the fascination for gamification in the service sector seems to be fueled by the increased measurability of service processes". Clearly, digital tools like *Jira* for task management or *Salesforce* for organizing sales processes make processes transparent, which formerly have either just been written down or in many cases never left the user's head. This makes service processes similar to production processes (see above) and thus easier to apply gamification.

Indeed, areas, where service processes have been more transparent before or were digitized sooner, have also been early subjects to gamification. For example, call-centers, which have already been described in 2017 by Castellan et al. [38] as good application areas "to help agents and supervisors managing their performance." At the same time, these early applications also gave rise to skepticism about gamification in business. For example, GroupOn Latin America is cited (also by Castellan et al. [38]) as follows: "PlayVox [a gamified system for call-centers] lets us detect and make a quick diagnosis of underperforming agents." In this case, gamification is used as a tool to find and dismiss underperforming employees, a malpractice giving rise to articles with titles like "Don't Whip Me With Your Games" [21].

3 Implementation of the gamified application

Based on the state of the art and focus group discussions with the employees of the company, we developed the prototype of a gamified solution for providing company information to employees, scheduling work tasks, and organizing meetings. The focus group was meant to inform the design of the gamified application. We recruited four team leaders (two men and two women) representing four different areas of the company which are especially affected by the gamified application: IT, marketing, training, and human resources. In the 2-h moderated discussion the following areas were touched upon: design, data security and anonymity, gamification elements to be selected, reward mechanisms to be implemented, and integration into the corporate IT structure.

Most of the discussion and the resulting recommendations directly informed the design. Key elements are a modern, light design incorporating colors of the corporate logo, a simplified login allowing persons to stay anonymous if they prefer to, a careful approach regarding avatar customization to maintain a corporate mindset, and finally a modest approach regarding rewards, mainly consisting of vouchers for the corporate mensa.

In the subsequent sections, we will provide an overview of the gamification elements that have been incorporated, along with their suitability, as informed by relevant

frameworks in the field (see Section 3.1). Subsequently, we will delve into the detailed presentation of how these gamification elements have been integrated into the application, with specific emphasis on the introduction of the minigames (refer to Sect. 3.2).

3.1 Gamification elements

By playing the proposed minigames (which will be described in Sect. 3.2), users can collect *general points* to "unlock" additional game elements. The achieved points or badges are then displayed in a ranking list. As suggested by Korn et al. [18], the ranking is used to list only the top 20% of the users to avoid frustration of lower-ranked users. Such an approach is especially suitable for *Explorers* [12], who crave to unlock new game elements and are motivated by collecting points and badges. Points or achievements are also appropriate for the player type *Player* [13], who likes to share their progress or compare with other users.

Earned points or badges can then be used to select a nickname and personalize an avatar. Personalized avatars should motivate the player type *Free Sprint*, who is attracted by creative processes [13]. Chou [14] also highlighted the significance of engaging players in creative processes. However, during the focus group discussions, users stated that the usage of avatars and anonymity within a company might become a hurdle: while nicknames and avatars create more freedom in expressing opinions, they also restrict direct communication.

Next to the avatar as an overarching gamification mechanic, also real-world rewards were proposed. These were included as a result of the focus group discussions. These small rewards (like vouchers for a meal in the company canteen) are given at certain point intervals (e.g., for every 100 points achieved). These rewards do not consume points like the avatar customization. They are integrated to ensure that collecting points is not solely a digital activity but engagement also has benefits in the real world.

Furthermore, by interacting with each other, users can collect *social points*. These two point categories (*general* and *social points*) were developed to draw users' attention to social activities with other employees and motivate them to interact more frequently. For example, the app features a group chat, which is locked in the beginning and can only be used after the user takes part in a training course. The chat should especially motivate *Socializers* and *Philanthropists*, as introduced by Marczewski [13], who want to interact with others, for example, to help them or who simply want to create social connections. Using social elements to engage users was also proposed in the Framework by Chou [14]. In addition to the chat function, physical rewards were integrated and users could also invite each other to grab a free coffee (see Fig. 1, right). As indicated in previous studies [13, 18], physical rewards are especially suitable for the type *Players*.

3.2 Minigames

The application features several minigames which are described in the following and summarized in Table 1. In the *task minigame*, users need to sort appointments based on categories and confirm finished tasks (Fig. 1, left). Upon successful completion of a task, users will observe a subsequent increase in their points, thereby enabling them to unlock additional features, such as the option to personalize an avatar. This minigame encourages teamwork by requiring users to establish team communication to coordinate goals. It also motivates employees to accomplish tasks more efficiently. This is

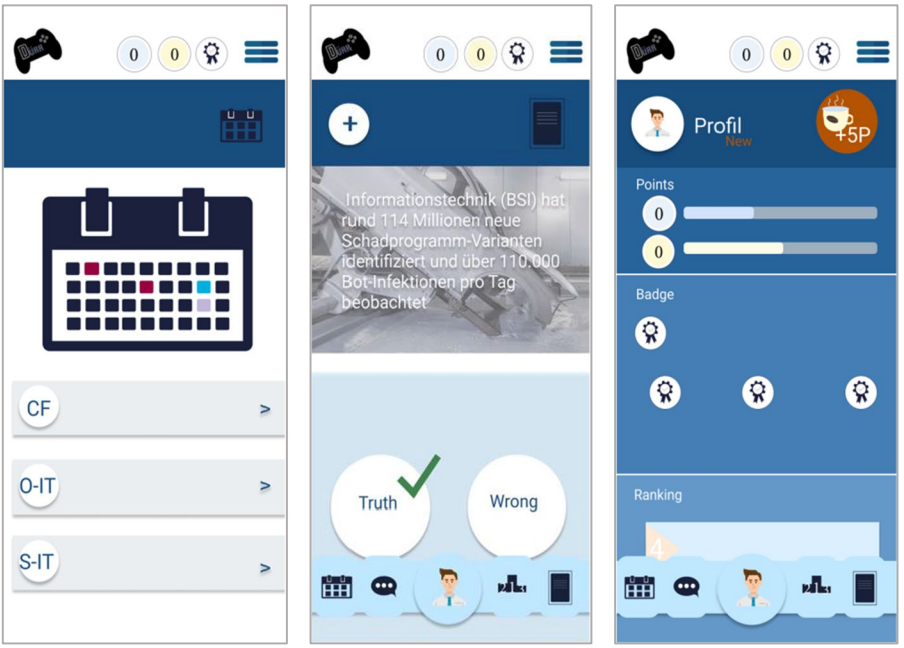

Fig. 1 The task minigame (left), the true-or-false minigame (middle), and the user profile (right)

in accordance with Harteveld et al. [39], emphasizing teamwork in games and should especially motivate *Socializers* and *Achievers*.

In the *true-or-false minigame*, users are presented with facts about the company (Fig. 1, middle). To collect points, users have to decide whether the fact is true or false. If the answer is wrong, they receive direct feedback about the correct answer. It is intended to integrate new employees and communicate information about the company. This minigame is again particularly suitable for *Achievers*, who want to learn new things and improve themselves [13].

The *meeting minigame* encourages employees to give anonymous feedback, express opinions, or propose new ideas. It is especially suitable for *Disruptors*, as it provides the possibility to vote and improve the system itself. This minigame enables users to collect points for best-rated opinions and ideas.

4 Study

The main objective of the study was to investigate generational differences regarding the acceptance of gamification in the environment of a large company. Additionally, we also intended to determine which gamification elements are best suited in a business context.

Table 1 Summary of implemented minigames, used gamification elements, and their focus

	Gamification Elements	Dynamics	Focus
Task Minigame	points, ranking, badges	team competition	organizational and team spirit development
True-or-False Minigame	points, ranking, badges	team competition	integration of new employees, learning
Meeting Minigame	points, badges	team competition	integration of new employees
Overall Mechanic 1: Avatar	the avatar is customized by using points	visible to all employees	A humorous and playful way to communicate in the corporate context
Overall Mechanic 2: Real-world Rewards	rewards are earned through points	only informal (not shown in the app)	ensuring that collecting points has (small) real-world benefits

4.1 Methods

Participants We recruited 367 employees via company-internal email (277 men, 89 women, and 1 other). Accordingly to their age, they were divided into three generations:

- Generation Z: the 16–24-year-olds, representing 13% (46 participants),
- Generation Y: the 25–40-year-olds, representing 49% (180 participants)
- and Generation X: the over 40-year-olds, representing 38% (141 participants).

Study design The questionnaires were designed to capture the preferences on gamification elements and minigames. The participants could assess the questions on a five-point Likert scale, ranging from zero (strongly disagree) to four (strongly agree). With individual questions about the minigames, the acceptance of these and the participants' opinions on achieving the planned goals (promotion of the organization, promotion of team spirit, promotion of solidarity) were investigated. Furthermore, the survey included multiple-choice questions. At the end of the survey, participants could make further comments or remarks about gamification or fill in free-text fields.

Data analysis Free-text fields were evaluated using the Mayring model [40]. Furthermore, because the data do not follow a normal distribution (according to the Anderson–Darling test), we applied the Kruskal–Wallis test to evaluate the statistical significance. For the pairwise comparison, we employed the Tukey–Kramer test to investigate if there are significant differences between individual groups. Additionally, we calculated Cohen's d effect sizes to determine the between-group effects [41]. The standard values of 0.2, 0.5, and 0.8 are generally considered small, medium, and large effect sizes. Moreover, we computed the Spearman's rank correlation coefficient and tested for significant correlation.

4.2 Results

In the following, we present results regarding generational differences, gamification elements, and the minigames.

4.2.1 Results on generational differences

Table 2 summarizes descriptive statistics for statistically significant variables among groups. Regarding the attitude towards the introduction of gamification at work, the results show a statistically significant difference among generations ($\chi^2(2) = 19.78, p < .001$). As detailed in Fig. 2, there is a significant difference between Generations Z and X ($p < .05$, with a medium effect size $d = .64$), as well as Generations Y and X ($p < .001$, with a small effect size $d = .44$). The Spearman's rank correlation further indicates a small negative correlation between the two variables ($r(1) = -.23, p < .001$).

We further analyzed which generation generally agrees to use a gamified application at work (see Fig. 3, left). Both younger generations, i.e., Z and Y agree to use the application most often, whereas Generation X is more reluctant towards using the gamified app in everyday work. Specifically, results show a significant difference among generations ($\chi^2(2) = 25.66, p < .001$) with a significant difference between Generations

Table 2 Descriptive statistics and statistical comparison (Kruskal–Wallis test) among groups

	Gen. Z (n = 46)	Gen. Y (n = 180)	Gen. X (n = 141)	Kruskal–Wallis	Spearman's correlation coefficient
	Mdn (IQR)	Mdn (IQR)	Mdn (IQR)	$\chi^2(2)$, p	r(1), p
Attitude toward the introduction of gamification	3(1)	3(1)	2(2)	19.78, < .001	-.23, < .001
Willingness to use a gamified app at work	3(1)	3(1)	2(2)	25.66, < .001	-.26, < .001
Impact of gamification on motivation at work	3(1)	2(1)	2(1)	26.01, < .001	-.27, < .001

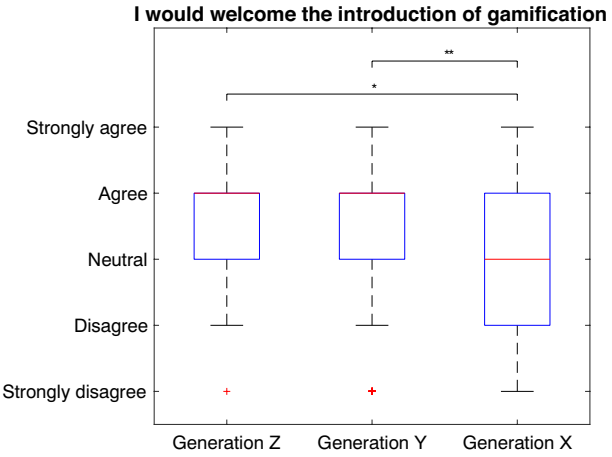

Fig. 2 Generational differences in the attitude towards the introduction of gamification

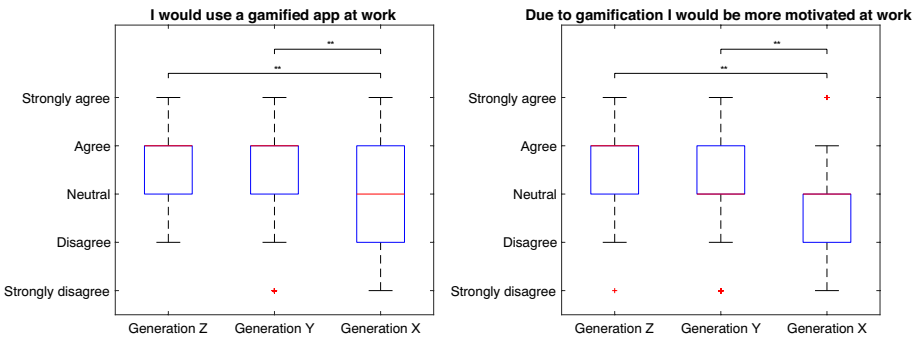

Fig. 3 Generational difference in willingness to use a gamified app at work (left) and impact of gamification on motivation at work (right)

Z and X ($p < .001$, with medium effect size $d = .74$) as well as Generations Y and X ($p < .001$, with medium effect size $d = .49$). The Spearman's rank correlation further indicates a small negative correlation between the two variables ($r(1) = -.26, p < .001$).

Additionally, we investigated which generation thinks that gamification can contribute to higher motivation at work (Fig. 3, right). The results again show significant differences among generations ($\chi^2(2) = 26.01, p < .001$) with a significant difference between Generations Z and X ($p < .001$, with a medium effect size $d = .76$) as well as Generations Y and X ($p < .001$, with medium effect size $d = .48$). The Spearman's rank correlation further indicates a small negative correlation between the two variables ($r(1) = -.27, p < .001$).

70 participants provided additional comments and remarks on gamification. Participants that are more reluctant towards the introduction of gamification (i.e., employees over 40 years of age) think that there is not enough time to play or use a gamified app at work. In particular, they think that because new tools or apps first need to be learned, this requires additional time and generates pressure. Furthermore, employees also believe that the supervisors might not accept playing at work. Moreover, participants mentioned that work and playing should be strictly separated, as games can distract from work.

Table 3 Descriptive statistics and statistical comparison (Kruskal–Wallis test) for gamification elements among groups

Gamification Element	Gen. Z (n = 46)	Gen. Y (n = 180)	Gen. X (n = 141)	Kruskal–Wallis	Spearman's correlation coefficient
	Mdn (IQR)	Mdn (IQR)	Mdn (IQR)	$\chi^2(2)$, p	r(1), p
Avatars	3(1)	3(1)	3(1)	3.03, .21	-.03, .6
Badges	3(1)	3(1)	2(2)	28.69, < .001	-.27, < .001
Leaderboards	2(1)	2(2)	2(2)	6.66, .04	-.13, < .05
Points	2(1)	2(2)	2(1)	23.41, < .001	-.24, < .001

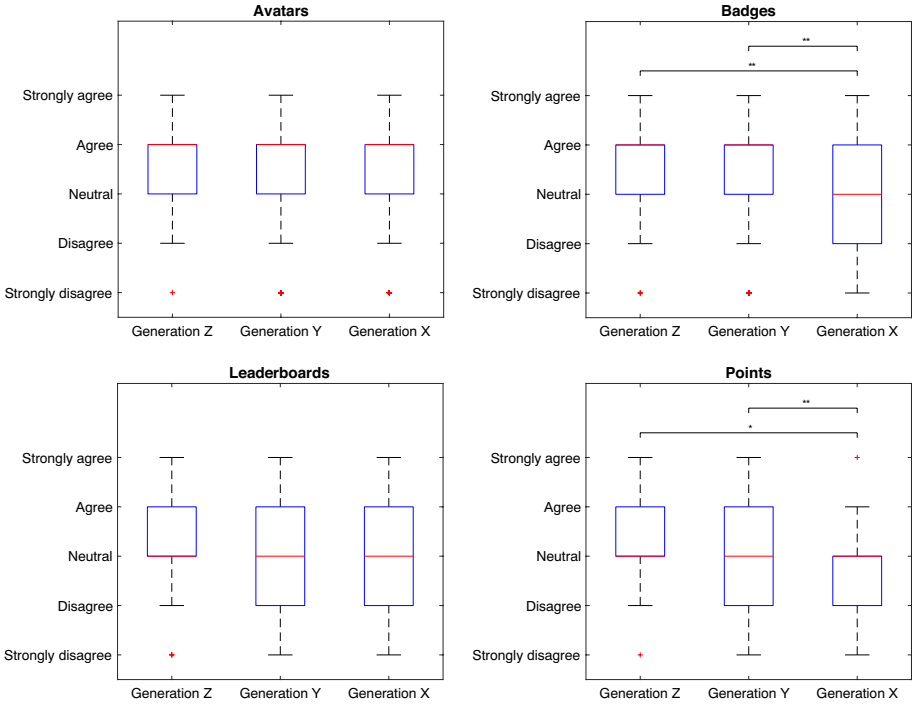

Fig. 4 Preferred gamification elements among different generations

4.2.2 Results on gamification elements

The analysis of gamification elements yielded valuable insights into employees' preferences. Participants were asked to respond to the question: "The gamified app should include [avatars/badges/leaderboards/points]." Results indicated that across all three generations, avatars were the most preferred gamification element (see Table 3 and Fig. 4), with no statistically significant differences observed among generations. However, some participants raised concerns: the appropriateness of avatars in business environments was questioned when their appearance can be altered to differ from that of the user.

Similarly, badges are also preferred by Generations Z and Y whereas Generation X remains neutral. The results show significant differences among generations ($\chi^2(2) = 28.69, p < .001$) with a significant difference between Generations Z and X ($p < .001$, with a medium effect size $d = .73$) as well as Generations Y and X ($p < .001$, with medium effect size $d = .53$).

Results on leaderboards and points are neutral. Some participants mentioned that they dislike leaderboards and points as they require them to play against other employees. In particular, participants mentioned that displaying individual users or teams on leaderboards and playing against each other might cause envy, pressure, and negative stress.

Furthermore, as seen in Fig. 5, the results of multiple-choice questions (n = 313, 543 statements in total) regarding rewards revealed that participants prefer receiving physical rewards, i.e., a canteen voucher in the first place, followed by making a team trip. Additional reward forms mentioned were the ability to change the avatar, receiving free coffee, and finally unlocking a minigame.

4.2.3 Results on minigames

The data in Table 4 and Fig. 6 shows that the *true-or-false minigame* is favored especially by the youngest generation. Moreover, Generation Z thinks that the *true-or-false minigame* is suitable and helpful to integrate new employees into the company. Thereby, results revealed a significant difference among groups ($\chi^2(2) = 12.27, p < .05$) with a significant difference between Generations Z and X ($p < .05$, with medium effect size $d = .61$). The Spearman's rank correlation further indicates a small negative correlation between the two variables ($r(1) = -.17, p < .001$).

Furthermore, Generations Z and Y also accept the *meeting game*, whereas Generation X is neutral (see Fig. 7, left). The focus group discussions revealed that such a game encourages employees who rarely give opinions to express themselves. However, several employees (probably the less shy ones) stated that no game is needed to express their opinions.

The *task minigame* is disliked across all three generations (see Fig. 7, right). As already mentioned for gamification elements such as leaderboards and points, participants think that these are not suitable, as they promote competition among the employees and may cause a bad atmosphere at work.

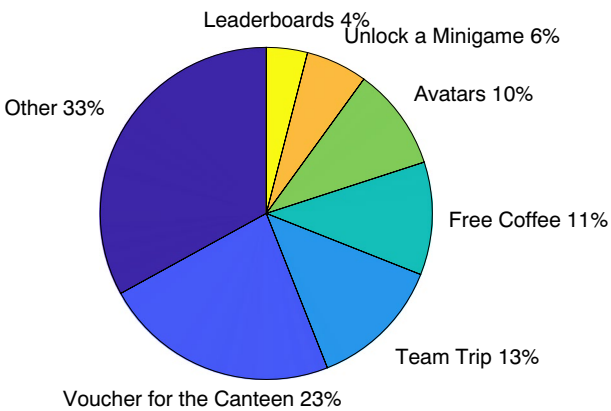

Fig. 5 Results on reward forms

Table 4 Descriptive statistics and statistical comparison (Kruskal–Wallis test) for minigames among groups

	Gen. Z (n = 46)	Gen. Y (n = 180)	Gen. X (n = 141)	Kruskal–Wallis	Spearman's correlation coefficient
	Mdn (IQR)	Mdn (IQR)	Mdn (IQR)	$\chi^2(2)$, p	r(1), p
Preference of the true-or-false minigame	3(0)	3(1)	3(2)	13.96, < .001	-.19, < .001
Usefulness of the true-or-false minigame for onboarding	3(1)	3(1)	3(1)	12.27, < .05	-.17, < .001
Preference of the task minigame	2(1)	2(2)	1(2.25)	14.15, < .001	-.20, < .001
Preference of the meeting minigame	3(1)	3(1)	2(3)	7.21, < .05	-.13, < .05

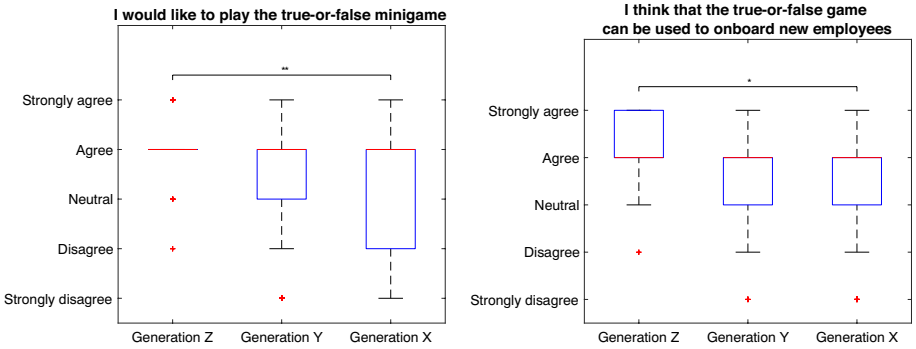

Fig. 6 Preferences (left) and usefulness for onboarding of new employees (right) of the true-or-false minigame

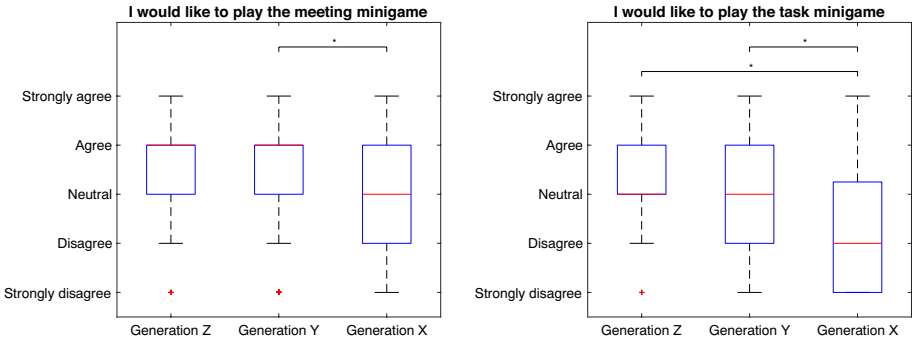

Fig. 7 Preferences of the meeting (left) and task (right) minigame

5 Discussion and re-design

The results in Sect. 4 show that in particular the youngest generation (employees between 16 and 24 years old), generally accept gamification and also can imagine using a gamified

app at work. In several aspects, Generation Y (employees between 25 and 40 years old) also accept it or could at least be motivated to use it, as long as it is seen as beneficial and does not cause additional work for them. Some employees are reluctant against gamification and expressed concerns: the main concern was that it would distract too much, causing users to spend too much working time playing games. Another concern was that employees do not have enough time to use the application due to time constraints. In order to promote a gamification application to be used during work time, it would first need to be accepted by the supervisors. Furthermore, gamification must not create any new effort but should be integrated into existing systems without making everyday work more difficult.

The utilization of the gamified app must also not be mandatory and should not discriminate against employees, who choose not to engage with it. As previously highlighted by Lessel et al. [21], users should determine for themselves the timing, context, and manner in which specific aspects are subjected to gamification. Moreover, in light of inclusivity concerns, it is imperative to acknowledge that in Germany alone live approximately 8.2 million games with disabilities [42]. Hence, there exists a demand for barrier-free gaming experiences. Consequently, applications should be designed to be accessible to the widest possible range of individuals, including employees with disabilities. In doing so, these applications should facilitate equal participation, enabling employees with disabilities to use the same application and enjoy the same minigames as their non-disabled counterparts [43].

As a result of the findings described in Sect. 4, the gamified application was adapted in three aspects:

Firstly, the avatar was revised, as it was the most preferred gamification element, especially by Generation Z. Birk et al. [44] have drawn attention to the fact that players' motivation can increase if the avatar looks similar to themselves. Therefore, the new avatar should be automatically created, e.g., from the application photo or a selfie. Using existing tools like Bitmoji, an uploaded photo can be converted into an avatar that looks similar to the employee and appears on their profile (see Fig. 8, left and middle).

Secondly, the *true-or-false minigame* was revised. Instead of simply presenting facts about the company, a Jump 'n' Run game has been conceptualized. In this game, users collect various experiences and learn facts while virtually "running" through the company (see Fig. 8, right). Thereby, the minigame should be extended with direct feedback to provide additional information on the fact.

Thirdly, as physical rewards were also well accepted, additional rewards should be introduced, e.g., doing small sports activities with a colleague, as sport reduces stress and strengthens team spirit. However, the choice of meaningful gamification elements for promoting physical activity needs to be well considered [45].

6 Conclusion and design recommendations

In this work, we examined the acceptance of gamification across Generations Z, Y, and X and possible challenges arising from its integration into a large company. The findings of the study with 367 participants yielded some interesting results. The major results are:

- Generation Z, aged between 16 and 24, is most likely to play a gamified app and also welcomes an introduction of such an app in a business context. Thereby we found a small significant correlation between the age groups and the acceptance of adopting

Table 5 Recommendations for gamification elements in large companies

Gamification elements	Requirements and Recommendations
Points and Achievements or Badges	*Players* will respond well to rewards, such as points and badges as their "core" game elements [13]. Prior studies have also shown that removing gamification features, such as points, might have detrimental effects [46]. However, contrary to expectations, our results show that badges are rather accepted than points, although only by the two younger generations. Notably, especially older users generally exhibit lower motivation towards points or badges. Thus, rather than points, the inclusion of badges should be considered when developing a gamified application.
Real-World Rewards	The study results imply that employees are more enthusiastic about real-world awards than about virtual rewards. This finding is in accordance with Korn et al. [18], showing that physical rewards in games are suitable to motivate players. Therefore, the gamified business application should offer vouchers, free coffee, or award prizes for special achievements.
Levels and Progression	Levels and progression are the most suitable gamification elements for players who want to progress within a system by completing tasks, e.g., *Achievers* [47]. Such users often enjoy tackling difficult challenges, solving quests, and acquiring new skills. Our results corroborate this evidence from related work, as the *true-or-false minigame*, which fosters competition, emerged as the most preferred minigame among all three generations. Accordingly, quizzes or puzzles, which can be played alone or against other employees, are appropriate for gamified business applications.
Leaderboards	Leaderboards are suitable for *Players*, who are motivated by earning rewards within a system, independently of the activity [47]. However, it is important to consider that not all users like to share their data with others [48]. Our results show that the employees generally are skeptical about being listed individually or as a team. Some participants also mentioned that losing could trigger stress, demotivation, or cause envy and pressure among employees. Thus, while winning teams are named, lower-ranking teams should be kept anonymous. In gamified apps for business, leaderboards should be avoided or used with caution, as competitive pressure can spoil positive effects.
Avatars	In games or applications, users often use avatars to project their personalities into the virtual world [49]. Typically these are customizable, i.e., users can choose hairstyle, clothing, or body type. Ducheneaut et al. [49] observed that virtual bodies are often very different from the users' bodies. Especially users with a low level of openness appreciate the possibility to change or customize the avatar [48]. Although individually customizable avatars have motivational benefits both in games for entertainment and serious purposes [44], they might appear too playful in gamified business applications [48]. However, our results show that avatars were indeed a very popular feature, especially for the younger generations. However, in business contexts, the avatars should reflect the look of the user rather than offering cosmetic features like funny haircuts or even tattoos.

Table 5 (continued)

Gamification elements	Requirements and Recommendations
Clear Goals and Feedback	Although clear goals and feedback are not used to motivate users as often as other gamification elements [7], feedback is essential. Especially in a learning context users need to assess their progress and work towards achieving goals [50]. Clear goals and feedback within minigames are necessary to better support the learning process and enable users to work towards achieving the goals. For example, the developed *true-or-false minigame* should include direct feedback and provide details about the fact. The necessity for providing feedback, especially in quiz-based games, was also recently identified by Mazarakis and Bräuer [51]. Therefore, in business contexts, when gamification is used to transfer knowledge, feedback should always be direct and timely.
Minigames	Minigames or features should be designed to be easy to use and intuitive, requiring no or only minimal training. They should be integrated into existing workflows and not cause additional working time. Most importantly, gamification should accompany everyday work. Based on our results, the youngest generation is most likely to use a gamified business app. Therefore, in business contexts, minigames for recruiting, onboarding, or integrating new employees are especially useful.

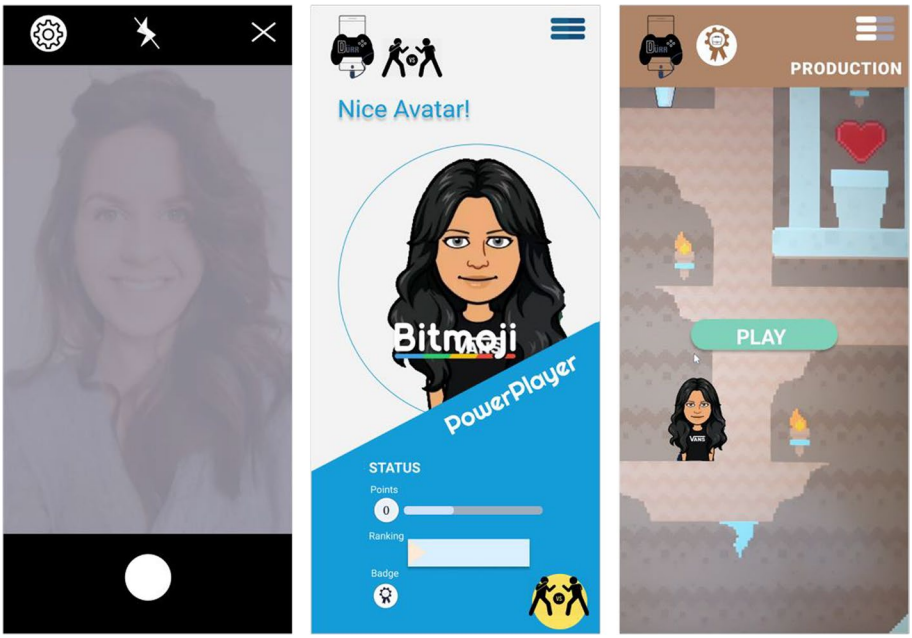

Fig. 8 Creation of an avatar for the user profile (left and middle) and jump'n'run game (right)

gamification in the workplace ($r(1) = -.23, p < .001$). In contrast, Generation X, aged

Table 6 Distribution of gender across groups

	Gen. Z	Gen. Y	Gen. X
Male	26	138	113
Female	20	42	27
Other	0	0	1

40 and above, is more reluctant towards the introduction of gamification.

- On the one side, the most preferred gamification element across all three generations are avatars, without significant differences. However, we found a significant correlation between the age groups and badges ($r(1) = -.27, p < .001$), indicating that badges are accepted only by Generations Z and Y. On the other side, employees are neutral towards leaderboards and points.
- Regarding rewards, the analysis has shown that physical rewards, such as vouchers, team trips, or free coffee are preferred over virtual rewards.
- Minigames introducing the facts about a company, such as the *true-or-false minigame*, are most accepted by Generation Z, with a significant correlation ($r(1) = -.19, p < .001$). Moreover, Generation Z also believes that such a game can be used to integrate new employees into a company.

As this study was carried out with a relatively large number of participants, it provides insights into the acceptance of gamification in large-scale real-world business environments, which can serve as a valuable reference for organizations facing similar circumstances. Drawing upon the findings from this study, we provide design recommendations for future gamified applications in larger companies encountering a similar business context. These recommendations, as detailed in Table 5, aim to increase the acceptance of gamification and make a gamified app more attractive and motivating.

Limitations and future work Although the study was carried out with a large number of participants (n = 367, see Sect. 4.1), the groups or generations were not balanced. In particular, the youngest generation with only 13% of the participants was underrepresented. Therefore, future work should focus on evaluating the gamified app, especially with this target group. Furthermore, we also found group differences concerning age and gender ($\chi^2(2) = 8.63, p < .05$) with a significant difference between Generation Z and X ($p < .05$). The distribution of genders based on age groups is detailed in Table 6.

Furthermore, the study has limitations in terms of generalizing findings to all business contexts—for example regarding different sectors with a weaker technological focus. Just like there is specific gamification research for health and education, different business sectors might also profit from dedicated lines of research.

As agile methods and focus group discussions have proven their worth during the development of the prototype, an additional discussion with a younger target group should take place in the future. Especially the re-designed app should be further evaluated. As already suggested by Mazarakis [52], future work should also emerge artificial intelligence and machine learning approaches, e.g., to better identify player types or detect essential game design elements. Furthermore, it should be analyzed how gamification elements could be integrated even deeper into the existing workflows of companies.

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Data availability The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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