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## Special Issue Editorial: Adaptive and Intelligent Gamification Design

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## Special Issue Editorial: Adaptive and Intelligent Gamification Design

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## Special Issue Editorial: Adaptive and Intelligent Gamification Design

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### Abstract:

This editorial provides an overview of the three accepted papers for the *AIS THCI* special issue on adaptive and intelligent gamification designs. The first paper examines conversational agents and how one can use gamification to make the design more engaging. The second study focuses on mobile fitness apps and analyzes the role that personality plays in apps and game designs. Finally, the third paper examines gamification in a virtual laboratory environment. Aligned with current work, we present future research directions that involve generative AI, the metaverse, and a shift in gamification research and practice in the future.

**Keywords:** Gamification, Personalization, Virtual Worlds, Artificial Intelligence

Fiona Nah was the accepting senior editor for this editorial.

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## 1 Introduction

Games and game-like elements have become ubiquitous in information systems (IS) and have created new and exciting ways to engage users and achieve desired outcomes, such as improving learning outcomes (Hamari et al., 2016), increasing brand loyalty (Mattke & Maier, 2021), enhancing intentions to conduct digital collaborations (Wiethof et al., 2021), and aligning organizational needs with user motivation (Barber et al., 2021; Nah et al., 2019). Gamification refers to using game or game-like elements to transform activities, systems, services, products, or organizational structures and afford a gameful experience (Hamari et al., 2019; Treiblmaier et al., 2018). Researchers have applied gamification in various domains, such as health, education, or crowd work, to increase engagement, satisfaction, motivation, and other psychological and behavioral outcomes (Dissanayake et al., 2019; Schmidt-Kraepelin et al., 2019; Super et al., 2019).

However, gamification does not constitute a one-size-fits-all solution that works equally well for all users and scenarios. Users differ in their personalities, preferences, motivations, behaviors, and other factors that influence how they perceive and respond to gamification (Nacke & Deterding, 2017). Additionally, new trends and directions in technological developments such as artificial intelligence (AI) require researchers to rethink and reframe classical gamification approaches. Therefore, a key challenge for gamification research and practice involves how to design and implement individualized gamification approaches tailored to the users' and contexts' specific needs and characteristics. It requires a deeper understanding of the factors that influence user experience and behavior in gamified systems and the methods and tools that can enable adaptive and personalized gamification.

With this introduction to our special issue of *AIS Transactions on Human-Computer Interaction* on adaptive and intelligent gamification design, we hope that readers find inspiration for future research that involves adaptive and intelligent gamification designs (Schöbel et al. 2021). We present three papers that address this challenge from different perspectives and domains in this special issue. The papers explore various aspects of gamification, such as artifact- and domain-centered gamification concepts, the benefits of individualizing gamification concepts, and novel digital environments for gamification. The papers presented in our special issue demonstrate that gamification can improve user outcomes. Gamification can be used in diverse contexts and, therefore, can contribute to advancing theoretical and empirical knowledge on individualized gamification to provide practical implications and recommendations for gamification designers and practitioners.

## 2 Overview of Papers

This special issue comprises three papers. We (i.e., the special issue guest editors) received two papers (Khosrawi-Rad et al., 2023; Sampat et al., 2023) as regular submissions to the special issue call, while we invited the third paper (Shadbad et al., 2023) after it received a nomination for the best paper at the Hawaii International Conference on System Sciences in the dedicated gamification mini-track (Shadbad et al., 2023). We selected the three papers for this special issue after multiple revision rounds. We appreciate the authors' and reviewers' willingness to make this special issue happen and their contribution to forward discourse on IS gamification (Lowry et al., 2020).

In the first paper, "Game-Inspired Pedagogical Conversational Agents: A Systematic Literature Review", Khosrawi-Rad et al. (2023) analyze pedagogical conversational agents (PCAs) and gamification. PCAs interact with learners using natural language to improve academic performance. However, PCAs often lack engagement and motivation, which can hinder their effectiveness in interacting with users. As a way to make interacting with PCAs more engaging, one can combine them with game-based approaches, such as gamification or game-based learning. The authors introduce the term "game-inspired PCAs" to refer to this combination and report on a systematic literature review that they conducted to explore current research on the topic and future directions. They analyze 50 papers on game-inspired PCAs and identify various relevant factors, such as the design knowledge base, game elements, thematic areas, target groups, PCA roles and types, AI, and adaptation possibilities. The authors use a morphological box to present their findings and highlight current research streams and future research recommendations. They conclude that game-inspired PCAs have promising application potential but that researchers and practitioners have not yet considered them holistically. Additionally, the authors suggest that the game-inspired PCA field requires more prescriptive design knowledge, more diverse game elements, more AI algorithms, and more intelligent adaptation to advance. The paper adds particular value to the *AIS THCI* community due to two important aspects. First, it summarizes conversational agents and gamification in the digital education domain and complements the knowledge on gamification in digital learning that has accumulated for over two decades

(Schöbel et al., 2021). Second, the paper tackles a highly topical issue when thinking about the potential for large language models to disrupt digital education and how conversational interfaces such as ChatGPT have made this technology accessible to a wide range of users (Schöbel et al., 2023). Thus, the paper paves a path forward for educators and interface designers to approach intelligent gamification interface designs via conversational logic (see also Section 3).

In the second paper, “Understanding Fitness App Users’ Loyalty and Word of Mouth through Gameful Experience and Flow Theory”, Sampat et al. (2023) examine the influence that gameful experience and personalization preferences have on fitness app users’ loyalty and word-of-mouth intentions. The authors draw on flow theory as their main theoretical lens and report on an online survey that they conducted among 431 fitness app users from India. Based on analyzing the data using partial least squares structural equation modeling (PLS-SEM), they conclude that gameful experience and a preference for personalized systems can lead to higher levels of flow as it can help users fully immerse themselves in fitness activities and lose track of time while exercising. They further report a positive association between experiencing flow and user satisfaction, which, in turn, leads to higher loyalty and word-of-mouth intentions. From our perspective, the study represents a valuable addition to gamification research in the context of health behavior change (Schmidt-Kraepelin et al., 2020) for two main reasons. First, it introduces personalization as a pertinent variable that plays a role in evoking flow and immersion. It opens up various interesting research avenues for many gamification researchers who design adaptive gamified information systems and investigate their behavioral effects (Schöbel et al., 2020). Second, from an organizational perspective, it demonstrates that fostering flow in fitness app users (e.g., via gameful experiences and personalization) can benefit the actors that provide such systems as it could increase user satisfaction, loyalty, and engagement in positive word-of-mouth activities.

In the third and final paper, “Best of Both Worlds: The Inclusion of Gamification in Virtual Lab Environments to Increase Educational Value”, Shadbad et al. (2023) analyze whether gamification in virtual labs effectively enhances learners’ educational performance by applying leaderboards to a developed platform. They used leaderboards as a motivational game element to analyze their effects on students’ engagement and participation. Many researchers have used competitive elements in gamification in their studies, such as the one that Santhanam et al. (2016) conducted. Shadbad et al. (2023) hypothesize that, with a leaderboard in a virtual lab environment, individuals will produce more services and end up with better task-specific self-efficacy. Over an 11-week period, the authors asked students in two groups (gamified vs. non-gamified) to construct services on their network that other students could access (e.g., webpage, email, file transfer). The leaderboard the authors designed provided a unique link between the virtual environment and the public world by providing a publicly accessible leaderboard for users that showed how many services they had successfully implemented. The results indicate that those students who operated with a leaderboard successfully implemented more services (especially more complex services) than students who did not operate with a leaderboard. The authors also demonstrate that students used the leaderboard 18 times a day on average. Besides analyzing how many services the students correctly implemented, the authors show that, with a leaderboard, students reported better self-efficacy. Based on their study results, the authors suggest that, although researchers have extensively studied the effect that gamification and virtual lab teaching techniques have on student learning outcomes in isolation, the two factors have a promising effect in combination on student learning outcomes as well. From our point of view, this paper points toward two important research streams that the HCI community currently discusses. First, virtual labs continue to increase in relevance and importance. Many researchers have begun to study how to design the so-called metaverse. With technological advancement progressing toward a more immersive digital environment, Shadbad et al.’s (2023) work highlights another perspective on how to design gamification concepts. In other words, we might need to rethink what competitive elements such as leaderboards mean and how one should design them. As the paper demonstrates, students used leaderboards to orient their progress, which future research studies could also examine. Second, the study highlights another important development and shift in teaching and learning. Educational programs will likely involve teaching some concepts remotely to students in some form going forward, which means that educators require new and efficient ways to improve teaching and learning concepts. With virtual labs, we might be able to teach specific skills, such as soft skills, more effectively, but we also might need to find other ways to motivate our students. In summary, the paper addresses some important aspects of adaptive and intelligent gamification designs.

## 3 Way Ahead

Current trends in HCI research point towards new trends and developments in adaptive and intelligent gamification designs. Trends such as the metaverse and generative AI will lead educators to new ways to create and explore multidimensional gamification concepts. Based on the results in the three papers in this special issue and how gamification may develop in the future, we provide implications for two major research streams that could change how we design gamification concepts: generative AI and the metaverse.

### 3.1 The Metaverse

The third paper discusses gamification in virtual labs. Virtual labs belong to the metaverse, also called Web 3.0. Aligned with current research studies, we can say that the metaverse will likely change gamification in the future. The metaverse refers to a massive-scale and interoperable ecosystem that encompasses other digital ecosystems that contain real-time rendered 3D virtual worlds that complementors and consumers can synchronously and persistently experience (Schöbel & Leimeister, 2023). As for why the metaverse will likely change gamification, it seems likely that organizations and individuals will use gamification elements in the metaverse to transform and apply game elements in virtual worlds. What we experience as effective and motivating elements in Web 2.0 might not work in the same way in a metaverse environment. Additionally, elements such as avatars will change. In the metaverse, avatars perform a social role suitable for a persona and act as a user's digital twin (Dwivedi et al., 2022; Park & Kim, 2022). Avatars no longer simply constitute icons; rather, they have increasingly become 3D user scans and might even anthropomorphically represent AI-controlled conversational agents. Hence, gamification will trigger flow. Future research will need to address and advance future gamification concepts and elements.

### 3.2 Generative AI

ChatGPT's launch on November 30, 2022, marked a milestone in AI technology's dissemination by demonstrating its capability to everyday people and left many people in academia and beyond in shock and disbelief. For gamification and HCI researchers, generative AI technologies' rapid advancement and their ongoing penetration into everyday life come with new fascinating challenges and research problems to tackle. First, AI advancements pose challenges to overcoming barriers to effective interaction between humans and AI-based systems (Schmitt et al., forthcoming). Extant research has reported poor trust in AI and negative emotions toward using AI technology as the main obstacles that prevent its potential from unfolding (Berente et al., 2021; Gillath et al., 2021; Thiebes et al., 2021). Gamification could act as a lever to link generative AI systems with positive experiential outcomes and, thus, help people build trust in AI in the long term. In video games, players interact with AI-based agents (i.e., non-player characters or NPCs), rely on their suggestions, and even form social connections with them (Ho & Ng, 2022; Wittmann & Morschheuser, 2022). By using and transferring knowledge from game design literature on how to evoke positive experiential outcomes and foster social bonds between humans and AI, we may be able to use gamification to design more trustworthy AI-based systems in the future. Second, generative AI may become a part of intelligent gamification concepts in the future. It could dynamically generate new content for gamification concepts based on individuals' needs and preferences. In this way, one could counteract the famous novelty effect (Rodrigues et al., 2022), which often results in the declining effectiveness of gamification over time. Of course, other directions for future research that demonstrate how gamification researchers can make meaningful contributions to the academic discourse that surround generative AI likely exist as well. We are sure that plenty more will open up as we further investigate its disruptive potential for society, the economy, and everyday life.

We hope that this special issue inspires further research and innovation on individualized gamification concepts and fosters interdisciplinary collaboration between researchers and practitioners from different fields. We hope this special issue stimulates discussion about the opportunities and challenges in customizing gamification concepts. We invite readers to read the papers in this special issue and join in on the exploration to see where gamification will go in the future.

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