



Dr. Arfan Arshad<sup>1</sup>, Dr. Abid Ghaffar<sup>2</sup>, Farah Kainaat<sup>3</sup>, Muhammad Usman Siddique<sup>4</sup>

## Abstract

This study looks at how user experience (UX) and artificial intelligence (AI) interact dynamically in the gaming business and how these elements have changed over the course of several player generations. The study examines how AI integration affects gaming, immersion, and overall pleasure for people from different age cohorts by using a multigenerational lens. The study examines the effects of AI-driven features on player involvement and preferences, including dynamic narrative, adaptive difficulty, and personalised interactions. It also explores the difficulties and possibilities AI presents for developing inclusive and accessible gaming experiences for a range of consumers. The ultimate goal of this article is to offer insights on how AI will shape game design in the future, meeting the changing demands and expectations of players of all ages.

**Keywords:** AI-Powered Games, A Multigenerational Perspective, Gaming Sector, IT industry

## 1. Introduction

The gaming business is booming worldwide, and by 2030, it's expected to generate an astounding USD 682 billion in revenue (Market Research, 2023). The domination of mobile gaming, which already generates more than half of worldwide revenue and is expected to surpass USD 248 billion in 2022, is the main driver of this expansion (Mordor Intelligence, 2024). Although console and PC gaming continue to command a substantial portion of the market, other trends such as cloud gaming, esports, and augmented reality/virtual reality (AR/VR) are gaining ground and will likely influence the direction of the gaming industry going forward (Mordor Intelligence, 2024).

Geographically, the Asia Pacific area leads the world gaming industry, with 114.87 billion USD generated in 2022. This is mostly because of the region's sizable and technologically adept populace, especially in China (Fortune Business Insights, 2023). With their well-established gaming cultures and plenty of top publishers and developers, North America and Europe continue to be important participants in the industry. Furthermore, growing smartphone penetration and rising disposable income are driving the rapid expansion of emerging markets such as those in Latin America and Africa (Mordor Intelligence, 2024).

Despite its youth, Pakistan's gaming market is expanding in a positive way. Pakistan has a sizable player base that is predicted to grow to 50.9 million by 2026, with an estimated 36.8 million gamers, or around 16% of the country's population (Statista, 2023). According to Statista (2023), the market is expected to grow at a compound annual growth rate (CAGR) of 9.66%, from USD 30.23 million in 2022 to an anticipated USD 49.15 million in 2027. Due to the rapid rate of smartphone adoption, mobile gaming is predicted to produce USD 171.3 million in 2022, outperforming other categories. (Intenta Digital, 2022). On the other hand, the esports industry is booming as well; it is projected to be worth USD 10 million in 2022 and USD 20 million by 2025 (Intenta Digital, 2022). Notwithstanding persistent issues with funding and a qualified labour pool, Pakistan's youthful, tech-savvy populace, together with the country's burgeoning esports enthusiasm, bode well for the industry's future expansion.

Electronic games are always changing and provide a wide range of options in terms of content, pricing, and platform accessibility—all of which have a significant impact on how consumers will behave in the future (Seo et al., 2015). Moreover, mobile applications have advanced significantly over the last ten years (Akram et al., 2021; 2022; Ramzan et al., 2023), and 52 percent of all digital media interaction occurs through application usage (Akram & Abdelrady, 2023; Abdelrady & Akram, 2022), which accounts for the bulk of consumption (Lella and Lipsman, 2014). As users gain experience and develop diverse demands, their download habits change over time (Son, 2017). The video game business, which includes games for mobile devices like smartphones and tablets, has seen significant revenue growth. This has enhanced value creation for the industry as well as for players (Marchand and Hennig-Thurau, 2013). 19.2 billion downloads were made through Google Play and Apple's App Store in 2016 (SensorTower, 2017a). Additionally, in 2016 iPhone users spent \$40 on average per device for premium applications, which was an increase from 2015. The majority of consumer expenditure was on mobile games (SensorTower, 2017b). Therefore, it is essential to comprehend how to create mobile games more effectively in order to please the intended audience and boost value generation.

Thanks to technical breakthroughs and creative designers and developers, the digital game business has experienced constant change (Fullerton, 2018). The swift advancement has led to the incorporation of several novel functionalities, among them the incorporation of Artificial Intelligence (AI). With its unmatched levels of customisation, flexibility, and involvement, artificial intelligence has completely changed game development, design, and player experiences (Yannakakis et al., 2018). Even while artificial intelligence (AI) holds great potential for the gaming industry, its effects on user experience (UX) are still being investigated, especially in light of the varied viewpoints and tastes of gamers from all generations. This research explores the complex world of user experience (UX) in AI-powered games, concentrating on the disparate viewpoints, inclinations, and possible difficulties that players of various ages may confront.

AI integration in games offers a special chance to improve player immersion and engagement (Ryan, 2015). But there's still one important question. In what ways do gamers across generations see and use AI-powered features, and how much of an ethically sound, entertaining, and good experience are these interactions and perceptions? By using a multigenerational perspective to analyse the changing field of user experience (UX) in AI-powered games, this study seeks to close this knowledge gap. The goal of this study is to understand how players of various generations interact with AI-powered video games.

<sup>1</sup> Assistant Professor, School of Systems & Technology, University of Management & Technology, Pakistan, [arfan.arshad@umt.edu.pk](mailto:arfan.arshad@umt.edu.pk)

<sup>2</sup> Senior Lecturer, Dept. of Software Engineering, College of Computing, Makkah, Saudi Arabia, [aaghaaffar@uqu.edu.sa](mailto:aaghaaffar@uqu.edu.sa)

<sup>3</sup> Lecturer, Institute for Art and Culture Raiwind Road Lahore, Punjab, Pakistan, [farah.kainaat@iac.edu.pk](mailto:farah.kainaat@iac.edu.pk)

<sup>4</sup> Assistant Professor, Institute for Art & Culture Raiwind Road Lahore, Pakistan, [muhhammadusmansiddiq@gmail.com](mailto:muhhammadusmansiddiq@gmail.com)

The research uses narrative interviews as its main technique of gathering data in order to:

- Identify key factors that contribute to positive UX with AI in gaming for various demographics.
- Unveil the specific aspects of AI-powered gameplay that resonate differently with players of various ages.
- Explore and understand the ethical considerations surrounding AI in gaming, as perceived by different generations.

This study intends to provide important insights into the dynamics of user experience in the developing field of AI-powered games by examining and interpreting the participant narratives. Future game design and development may benefit from these insights, guaranteeing a more inclusive, interesting, and morally sound experience for players of all ages.

Any game's success depends on its ability to comprehend and satisfy the varied requirements and tastes of its user base (Nicholson, 2005). This study focusses on a particular but important facet of this problem: how different generations interact with AI-powered games. Through investigating this subject, the research aims to make the following contributions:

- Inform the development of AI features that are engaging and relevant for diverse user groups based on their age and preferences.
- Offer valuable insights for game designers and developers to create AI-powered games that are not only technologically advanced but also ethically responsible and inclusive.
- Contribute to the broader understanding of how technological advancements in gaming impact different generations and their interactions with games.

This research, therefore, holds significant potential to impact the future of game design, development, and overall user experience in the era of AI-powered gaming.

## 2. Literature Review

Artificial Intelligence (AI) integration is driving a major revolution in the game business. AI-powered games are opening up new avenues for story creation, player engagement, and overall user experience (UX) (Ryan, 2019). This analysis looks at how user experience (UX) is changing in AI-powered games while taking into account the viewpoints of various player generations.

Creating dynamic, personalized experiences that are tailor to each player's interests is one of the main promises of artificial intelligence in games. According to Smith et al. (2020), AI-powered opponents have the ability to adjust their degree of difficulty in real-time, providing a fascinating challenge for seasoned players and a welcoming atmosphere for novices. By customizing plots and character interactions in response to user decisions, AI can further personalize tales (Rollins, 2018). For gamers of all ages, these developments may result in a more captivating and immersive user experience.

When creating AI-powered games, it's important to take into account the diverse tastes and expectations of various player generations. It may be necessary to introduce AI-driven elements to players of older generations more gently, as they may be more used to traditional game mechanisms (Sutherland, 2009). On the other hand, younger generations may anticipate a more complex and subtle AI experience in games since they have grown up with AI integration in many facets of technology (Prensky, 2006). AI integration in games also poses some difficulties for UX designers. One issue is the possibility of the uncanny valley effect, in which players may experience uneasiness or discomfort while interacting with AI characters who resemble humans but aren't quite (Mori, 2012). Fairness and openness in AI-driven decision-making are also essential for preserving player happiness and confidence (Fairfield et al., 2021).

Despite these difficulties, AI has fascinating possibilities for developing more customized and interesting game experiences. Game creators may use artificial intelligence (AI) to create completely immersive and fulfilling gaming experiences for all players by learning the preferences of various player generations and resolving any concerns. The notion of user experience (UX) is garnering substantial interest in a multitude of technical domains, such as virtual reality, film, and computer games. Although phrases like "sense of presence" and "immersion" are used in these disciplines to characterize user experiences, a deeper comprehension of the psychological mechanisms at play is required. By putting out a paradigm for the user experience in digital gaming, this study seeks to close this gap.

The term "user experience" (UX) has been quite popular in the fields of interaction design and human-computer interaction (HCI) within the last 10 years. Interactive goods have developed beyond simple utility and functionality as technology has progressed, becoming in-demand objects with a dash of style and intrigue. Practitioners and scholars have embraced the idea of UX as a compelling alternative to traditional HCI, realizing that a limited emphasis on interactive products as just tools fails to capture the many and dynamic features of technology use. With its freedom from definition and openness to interpretation, the phrase offers hope for change and a fresh viewpoint.

The complete experience and satisfaction a user gets from engaging with a system, product, or service is commonly known as user experience, or UX. According to Nielsen Norman Group, a well-known research and consulting firm that specializes in usability and user experience, "a person's perceptions and responses resulting from the use and/or anticipated use of a product, system, or service" (Nielsen Norman Group, n.d.) is what is meant to be defined as "UX." Further support for this definition comes from ISO 9241-210, an international standard for human-centered design from the International Organization for Standardization (ISO), which defines UX as "a person's perceptions and responses that result from the use or anticipated use of a product, system, or service" (ISO, 2019).

The Interaction Design Foundation (IDF), a resource for designers and UX experts, shares this all-encompassing perspective on user experience (UX) when it defines UX as "a person's entire experience using a particular product, system, or service" (IDF, n.d.). Moreover, this interpretation is supported by the observations of Don Norman, a well-known authority on human-centered design, who defines UX as "encompassing all aspects of the end-user's interaction with the company, its services, and its products" (Norman, n.d.). Together, these references highlight how UX includes not just usability but also aesthetics, emotions, and value perception. The goal of UX is to design products that satisfy users' requirements and expectations while also providing value.

In An growing amount of focus is being placed on the experience that comes from using technology in many different domains of human-computer interaction. The phrase "sense of presence" is used to characterize the unique experience brought forth by virtual

reality (VR) technology and the big displays in movie theatres. The focus of display technology experts is on providing an image quality experience. In digital gaming, the term "immersion" refers to a player's intense involvement with a game. Even in the cognitively and task-oriented discipline of human-computer interaction (HCI), user experience (UX) is seen as crucial. Unlike the more work-related usability studies that have historically dominated the field of HCI, it has become a popular study topic.

Additionally, the ideal experience, or flow, is also being studied in a variety of scenarios including human-computer interaction, including Internet use. Many of the aforementioned ideas are vague and frequently employed in definitively as buzzwords to characterize the human experience. There is frequently a dearth of good empirical research. Experience may relate to nearly any degree of human consciousness and be used in a variety of contexts. In the sections that follow, we want to define, create, and broaden the notion of the user experience in order to encompass all pertinent psychological elements in a specific context—in this example, digital gaming. Experience psychology The definition of "experience" may be found in the Visual Thesaurus online with the following key points:

- Experience has two meanings: it can be something one has gone through and gained knowledge of or it can be the content of direct observation or participation in an event,
- Experience may have both mental and bodily states, and
- It is closely related to feelings and emotional sensations.

In this context, experience is defined as the result of firsthand observation or active involvement in an activity, such as playing a video game. This definition excludes experiences from life that broaden our knowledge and shape our personalities, as well as subjective states like daydreaming and dreams that originate from only internal images and experiences that are not directly observable to others, like experiencing pain. In the early years of psychology science, the "content of direct observation or participation in an event" was recognized as the main source of human experience.

According to William James, we perceive the world around us by attending to the features and events that interest us. Lot of environmental stimuli are perceived but only a little proportion of this is interesting enough to draw our attention and to become a content of our conscious experience. Most of our daily routines are experience rather automatically or sub-consciously. As long as everything goes as usually, this constant stream of thoughts does not require much of either our attention or active thinking. Such a state can be described as a micro-flow experience, which does not elicit intense feelings or peak experiences. We analyze the components of such intense periods of human-computer interaction that are distinct from the constant stream of consciousness and can have a significant impact on the person who is experiencing.

James Dewey separated so called everyday experiencing from a special experience that he named as an experience. According to Dewey, an experience has a clear beginning and an end and it has an effect on the one who experiences; strong emotions, assessment of a value system and even changes in behaviour. An experience can be received, for example, from digital gaming. It has a clear beginning and an end and for those who are willing to play, it is likely to provide something special. To understand and even measure such an experience we should understand the perceptions made from the particular environment, the focus of attention and the level of motivation to attend just these particular features. but what happens when we have the right level of motivation to perceive and attend to a particular environmental feature? Is that the experience then? How is this related to the two other points in our definition in the first paragraph 2) experience may have both mental and bodily states, and 3) it is closely related to feelings and emotional sensations.

Through this process of interpretation, each experience is given a value and significance. The observed characteristics also trigger recollections from the past, when the current circumstance is discussed and re-examined. Our bodies experience emotional reactions that manifest as various sensations in response to both previous memories and present characteristics and occurrences. The quality and intensity of the experience itself are enhanced by these physiological conditions.

Psychologists generally agree that the structure of consciousness consists of some combination of emotional attitude towards the information, cognitive interpretation, and motivating component. Moses Mendelssohn (1729–1789) arguably introduced the trinity of mind—will, intellect, and feeling—in his "Letters on Sensation." The trilogy was dissected and examined independently over the decades when psychology focused on the paradigms of information processing and stimulus-response interactions. Even if the three elements occasionally overlap, making it difficult to distinguish between them, if the trio is not regarded as a whole, a valuable framework is lost. Digital gaming experiences cannot be comprehended without taking into account such a comprehensive view of the human mind. Therefore, the perception of an event or environmental aspect is the first step in the dynamic process of experiencing. It takes on the character and intensity that it does when we shift our attention and act on what we have experienced. It might never be possible to completely comprehend the subjective experience of another individual. However, if we focus on certain visible aspects of our surroundings, there are probably going to be commonalities among different encounters. Examining these patterns in constrained settings like interactive, psychologically complex gaming worlds is probably going to increase our understanding of how subjective experiences are formed as well as interactive digital environments. In this regard, computer games are developing into a very detailed and reliable simulation environment for researching psychological processes.

Grasp human perception and attention, pertinent details about an individual's background and present, a grasp of their motives, and cognitive-affective assessments of a precisely specified usage scenario involving a specific technology are all necessary for creating a user experience. To analyse user experience, these experiential elements can be used as heuristics, or general guidelines. By gathering multivariate experiential profiles from several individuals, a comprehensive comprehension of the experiences related to a specific and well-defined technology may be established.

While technology has been around for a century and has had little time to evolve in relation to human evolution, human experience has a lengthy evolutionary history. Thus, while technology is simple, the human mind is complicated. It is reasonable to suppose that people view technology using the same psychological "tools" that we use to perceive things in our daily surroundings. The feeling of presence in a first-person shooting game, for instance, may be evoked by modern technologies. Still, the psychological aspects of the encounter are already there in our consciousness. The degree of emotional arousal, the focus of attention, and perceptual cognitive problems like perceived reality and spatial awareness are the fundamental factors that lead to presence.

Experience is a comprehensive thing. There would be a lot of unanswered questions if, for instance, the trilogy of mind were to be studied in its entirety. The motive and cognitive-affective components of the experience are thus disregarded, so studying merely one part of the experience—such as the sensation of presence—would not reveal anything about its quality or worth. Ironically, the trilogy-of-mind heuristics have become less popular in psychology research due to the scientific imperative for objective measurements. The trilogy has been disassembled to satisfy the requirements of objectivity. Research has only focused on those elements, such fundamental emotions, that can be measured objectively using techniques like physiological reactions. Studies examining the psychology of digital gaming have also shown this.

Effective subjective approaches must be used to address the key elements of the experiential phenomena in gaming in order to comprehend them. The greatest expert to explain subjective perceptions of his environment is the person himself. It becomes appropriate to try to delve deeper into these notions using objective measurements only if the structure of these conceptions in a certain environment is understood. Questionnaires and interviews are commonly used as examples of subjective approaches. Interviews frequently simply map the emotions of the participants, and questionnaires frequently contain unclear items that create crude scales with poor reliability. For example, a few questions that are purported to create a presence scale directly address the complicated construct of the feeling of presence.

### **3. Methodology**

This case study examines how user experience (UX) in AI-powered games is changing from the viewpoint of different generations. Here, we go into depth about the participant selection process, data gathering strategies, study design, and data analysis methodologies used.

The design of the study is a single-case study. For a thorough discussion of case study designs, see Yin, 2018, *Case Study Research and Applications: Design and Methods*. This approach is ideal for in-depth investigation of a phenomena inside a constrained system. The user experience (UX) of AI-powered games over various generations is the subject of this inquiry.

Multiple data collection methods will be used to gain a comprehensive understanding of UX across generations: *Semi-structured Interviews*: Interviews will be conducted with participants from different generations (e.g., Millennials, Gen Z, Baby Boomers) who actively play AI-powered games. The interviews will explore their experiences, preferences, and challenges regarding UX in these games. A pre-defined interview guide will ensure consistency, while allowing for probing follow-up questions to capture rich details. *Gameplay Observation*: Participants will be observed playing a pre-selected set of AI-powered games. This observation will allow researchers to directly witness user interactions and identify any usability issues or areas of improvement.

A combination of purposive sampling and snowball sampling methods will be used to find participants. The participation of people from various generations who actively play AI-powered games will be ensured by purposeful sampling. Utilising the networks of current participants, snowball sampling will find more individuals that fit the requirements. The target is to recruit a balanced sample size from each generation (e.g., Millennials, Gen Z, Baby Boomers). The specific number will depend on data saturation, the point at which no new insights emerge from further interviews. Thematic analysis will be the primary method for analyzing interview data. The collected data will be coded for recurring themes and patterns related to UX experiences across generations. Gameplay observation data will be analyzed through narrative coding, focusing on user interactions and behaviors.

Data from all sources (interviews, observations) will be triangulated to ensure the validity and reliability of the findings. This process involves looking for convergence and divergence across the data sets to develop a rich and comprehensive understanding of UX in AI-powered games across generations.

### **4. Themes and Pattern Identification**

#### **4.1. Core Gameplay Mechanics**

A key component of game design is this cycle. Players must utilize their talents and techniques to overcome problems in games. Success in overcoming these obstacles is rewarded, which may take the form of achievements, points, new content opening, or just a sense of pride. Players are kept interested and inspired to play by this cycle. Players are given clear objectives and a sense of advancement in a well-designed game. It should be clear to players what they are aiming for and give them a sense of consistent progress. This can be accomplished via finishing stages, getting new skills, or moving through a narrative. Agency and Control: In the game environment, players must have the impression that they are in charge of their character and their actions.

#### **4.2. Engagement and Emotional Response**

Immersion: A game is more likely to be fun if it can fully submerge the player in its universe. This may be accomplished with engaging sound design, eye-catching graphics, and a well-written story that pulls the player in. Joy, excitement, and pleasure are examples of good emotions that may be evoked by games, but these feelings are essential to having fun. This might result from reaching objectives, conquering obstacles, or just taking in the wonder and beauty of the gaming environment. Flow State: The term "flow" refers to a situation in which a player is very absorbed in an activity, experiencing a sense of timelessness and total attention. This state of flow may be facilitated by well-designed games, which will make the experience very joyful. Games that offer a variety of activities and experiences can hold players' interest for longer. Introducing new mechanics, challenges, and environments can keep gameplay fresh and prevent boredom.

#### **4.3. Well-defined Challenges**

Progressive Difficulty: A cleverly created game provides a gradual rise in complexity over time. This guarantees that players are never overly pushed. One should be able to learn the ropes in early stages, then put their newly gained talents to the test in later levels. Variety in Challenges: Games shouldn't constantly provide the same kind of obstacle. Gameplay is kept interesting by introducing new mechanisms, opponent kinds, or puzzle components that force players to modify their tactics. Balanced Challenge: Fair and attainable challenges are the finest kind. When a task seems unachievable, one may become frustrated and give up. On the other hand, too simple of a task won't make you feel like you accomplished anything.

#### **4.4. Opportunities for Mastery**

**Skill-based Progression:** As players advance in skill, the main gameplay loop need to compensate them. This can be accomplished by developing their strategic thinking skills, learning new skills as they advance, or perfecting certain procedures. **Mastery Curve:** A perfect mastery curve enables players to advance steadily with time. Early difficulties bring one a feeling of achievement as they acquire the fundamentals. As tasks progress, they get more difficult, so players have to hone and demonstrate their skills. **Depth and Complexity:** Players can master a variety of abilities and techniques in games with depth. This enables players to try out various strategies and identify solutions that work for their playstyle.

#### **4.5. Intrinsic Rewards of Mastery**

**Sense of Accomplishment:** It feels good to overcome a challenging obstacle. Because of their acquired abilities and strategic thinking, players experience a sense of pride and fulfilment. **Self-efficacy and Confidence:** Gaining mastery increases one's self-efficacy. Gamers who have overcome hurdles have self-efficacy because they know they can overcome new ones. **Drive to Get Better:** One of the strongest drives is the desire to get better at a game and become an expert player. Gamers keep playing and challenging themselves to get better at what they do and take on bigger tasks.

#### **4.6. Emotional Connection**

**Emotional Payoff:** A compelling tale in a video game should make the player feel something. Anything from happiness and enthusiasm to grief and rage might be this. An emotional connection to the narrative and characters heightens the experience's impact and memorability. **Suspension of Disbelief:** In order for a tale to be really engaging, players must be prepared to set aside their critical thinking and embrace the setting and concept of the game. A well-written universe and compelling storytelling can help with this suspension of disbelief.

#### **4.7. Practical Implications**

The research's conclusions provide makers of video games with practical advice on how to make AI-powered titles that are more accessible and captivating. Developers may enhance player happiness and retention by customizing gameplay experiences to target demographics based on their understanding of how various generations view and engage with AI. Furthermore, the results of the study can guide the creation of AI features that are accessible, encouraging greater player engagement and diversity in the gaming community.

#### **4.8. Theoretical Implications**

This work adds to the expanding corpus of research on the relationship between artificial intelligence and human-computer interaction, especially in the context of gaming. The research broadens the theoretical knowledge of how technology affects user behavior and perception across age groups by looking at the intergenerational element of AI-powered gaming experiences. Future investigations on the long-term effects of AI on human cognition, social interaction, and entertainment choices can build upon the study's findings.

#### **4.9. Future Research**

The long-term effects of AI on player behavior and psychology require more investigation. Furthermore, research on the moral implications of AI-powered games is essential, especially with relation to player manipulation and privacy. In summary, AI is a revolutionary force in the video game business that will influence UX in the future. Through the consideration of various player generations and the resolution of potential obstacles, developers may leverage AI's capabilities to produce outstanding gaming experiences for everybody.

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