

Interactive Art and its Relation to the Concept of Gamification

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ABSTRACT:

This research explores the connection between interactive art and gamification, demonstrates their convergence through human interaction and technology. Interactive art highlights the audience's role, converting them from passive spectators to active participants dynamically shaping the artwork. This shift enhances the artwork's impact, adding personal and emotional aspects while deepening human connectivity through continuous feedback. By leveraging digital media and generative technology, interactive art creates Sophisticated environments influenced by audience interaction. Similarly, the study investigates gamification, which incorporates game elements into daily activities to foster engagement and motivate users through intrinsic and extrinsic rewards. An infographic was used to illustrate the general gamification benefits, which were analyzed for application in interactive art. This application revealed shared principles and a strong interrelation between the two fields. Practical examples are provided to demonstrate how this connection can encourage positive behaviors, such as participation, learning, and creativity. This research concludes that combining interactive art and gamification enhances the use of technology to create innovative experiences that influence human behavior. It recommends applying these concepts in education to motivate learners and in marketing to engage customers through immersive experiences, with an emphasis on the importance of continuous feedback to improve quality and enhance creativity.

1- Introduction

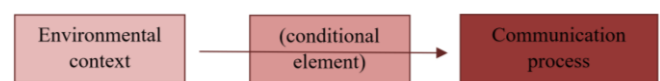
In our digital age, the boundaries between the physical and virtual worlds are increasingly Vanishing (Jordan, 2009). This significant transformation is not only due to the advanced technological dominance that shapes life today but also to innovative human interaction, which has played an essential role in this unprecedented transformation (Öngel et al., 2024). We observe the intersection of fields that may appear different, yet through the synergy of technology and human interaction, they become closely interconnected (Magliocca et al., 2024).

Here, we find ourselves addressing two fields, each distinguished by its reliance on technology and the digital world, in addition to innovative human interaction. One such field is interactive arts, which employs the digital and technological realm to erase the boundaries between reality and imagination (Jasia Reichardt, 1968). In this context, the viewer transcends their traditional role as a mere observer of the artwork to become an integral part of the artwork itself (Bruder and Uçok, 2000), inseparable from it and essential for its completion. This can occur through interaction or feedback, which not only has the potential to alter the context of the artwork but also provides the artist with valuable perspectives about the artwork and the participant (Krzyszaniak et al., 2022).

This is supported by one of the most comprehensive definitions of interactive art, provided by Spiro Kioussis (Abdelrahman, 2013): "Interactivity can be defined as the degree to which communication technology can create a mediated environment in which participants can communicate (one-to-one, one-to-many, and many-to-many), synchronously and asynchronously, and engage in participation to exchange user-related messages. It also refers to their ability to perceive the experience as a simulation of interpersonal communication and

to enhance their awareness of remote communication."

As Jack Burnham (Jasia Reichardt, 1968) emphasized, the environmental context is critical to understand the artwork, and the components of the artwork encompass everything that interacts with the artistic process. Interactive art does not create a separation between art and life; rather, it establishes a continuous connection between them.



In the context of art and generative technology, several forms can be distinguished that highlight the relation between the artwork and the artist, as well as between the viewer and the environment. The basic categories established by Kurnock and Edmonds (Edmonds, 2003) apply to modern interactive artworks, as classified as (Edmonds et al., 2004):

- **Static:** The artistic object does not change and remains fixed, with the viewer interacting with it without any visible effect on others, as is the case in museums where interaction is visual and emotional, involving feelings.
- **Dynamic Passive:** The artwork changes automatically over time without the viewer's intervention. These changes originate within the artwork itself or are influenced by environmental factors.
- **Dynamic Interactive:** The artwork interacts with viewers and responds to their behavior.
- **Dynamic Interactive Varying:** The artwork changes and responds to viewers' behavior while also modifying its rules through continuous interaction, creating a unique interactive experience.

The Dynamic Interactive Varying category is a combination of Dynamic Passive and Dynamic Interactive, with the addition of a modification factor that alters the properties of the artistic object. This change can be initiated by either a human or a program. Consequently, the performance of the artistic system becomes unpredictable (Burger, 2023), transforming it into a generative art system that relies on the history of interactions with the artwork. The artist regularly updates the specifications of the artistic object, or the software agent learns from previous interactions and automatically adjusts its configuration. In this case, the performance of the artistic object varies based on its experiential history (Meng et al., 2023) .

A generative art system is a type of interactive artwork that evolves in response to participants' interactions through a software agent (Abdelrahman, 2013). Generative art is a creative process that relies on algorithms and artificial intelligence to generate new patterns, shapes, or colors (Epstein et al., 2023) .

These systems are characterized by changes that are not entirely random but exhibit a certain pattern, even though the rules generating the sequence may be unclear and unpredictable to the viewer. These dynamic artistic systems have evolved to become fully interactive, capable of responding to detected events through integrated sensor systems (Burger, 2023). In such cases, the artwork adapts to audience interaction, where participants' behavior influences the generative direction of the work, while they are also emotionally and intellectually affected by the interactive artwork (Boden and Edmonds, 2009).

The program uses a set of rules that adapt to audience behavior, making the interaction between the system and the viewer more dynamic and realistic. Additionally, it records and analyzes human responses to the artwork (Peña-Bickley, 2021), allowing it to adjust its behavior by modifying the rules it employs. Consequently, the system evolves based on its experience with participants, adding a continuous dynamic dimension and enabling

the artwork to interact with the audience in an innovative and ever-renewing manner (nftgenerator, 2023).

On the other hand, gamification stands out as one of the most significant innovations that transforms daily activities into highly inspiring and enjoyable experiences (Marczewski, 2015). Gamification is not merely about adding game elements to life tasks, entities, and non-game-related contexts; it also reimagines these tasks to make them more engaging, exciting, and challenging (Deterding et al., 2011).

Gamification works to stimulate specific behaviors in users and enables them to benefit from many of their natural desires (Hamari, 2017), such as learning, achievement, mastery, perseverance, collaboration, status, and social connection. It targets the love of interaction and competition inherent in the human spirit, applying this across various fields, including education, design, health, marketing, and business management (David Horachek, 2014).

Gamification demonstrates the effectiveness of the interactive approach in motivating and transforming human behaviors in innovative ways that were previously unimaginable by leveraging game elements (Matsumoto, 2016). Game design elements are divided into lower and higher levels, with Werbach (2012) presenting a hierarchical representation comprising three levels (Goethe, 2019) :

- Dynamics represent the highest level and refer to the basic rules and overall directions of the game, such as emotions, constraints, progress, and narrative, which contribute to building the game experience.
- Mechanics represents the level of action and motivations, such as challenges, competition, and rewards, which drive the game's functionality.
- Components are the enhancements and specific details of the dynamics and mechanics, such as avatars, badges, and tasks, which add depth and

personalization to the player's experience. These elements integrate to form a comprehensive user experience that includes aesthetic aspects like sound and visuals.

All of this is used in gamification for various purposes, with the aim of benefiting multiple fields for development-based learning, simulation, and risk mitigation to the greatest extent possible (Jaramillo-Mediavilla et al., 2024). For example: gamified learning, simulation learning (Electronic Almanac, 2021), and game-based learning. In general, gamification is divided into two main types (Wu and Santana, 2022) :

- **Extrinsic gamification:** This type focuses on external rewards or incentives, such as points, prizes, and certificates. The goal here is to motivate behavior through tangible or socially recognized rewards, such as material prizes or public recognition.
- **Intrinsic gamification:** This refers to gamification that involves internal motivation arising from the enjoyment and interaction with the activity itself, such as challenges, exploration, or a sense of achievement.

Accordingly, this paper aims to explore the relation between gamification and interactive art and the importance of this relation. Art has always been categorized as art for art, beauty and pleasure only, even if it uses technology, without highlighting the extent to which art can be integrated with many fields that can help in different areas of life such as education, marketing and other fields. On the other hand, the idea of gamification has not been fully utilized in our societies until now, although it is very common in product design, advertisements and others without paying attention to the term itself. The question here is whether a relation exists between them or not. If such a relation exists, what is it in detail, how did it emerge, and how

can it be utilized? This will be clarified through this research.

2- Materials and Methods:

From the above, we find common points between gamification and interactive art, including interaction, participation, and the use of technology. However, this is not all; there are more common points between the two fields of gamification and interactive art. This raises the question: how can we identify the greatest number of common points between these fields that will help prove the relation between them?

If we can prove that the goals and benefits of both fields are the same, then we have identified the greatest number of common points, thus proving the existence of a relation between them, not just any relation, but a close one. We will emphasize this relation through graphical representation because it is one of the clearest educational methods and helps to understand faster because the visual aspect accelerates the brain's understanding of the content.

A graph will be used to illustrate the benefits of using gamification in general (Figure 1). Another graph will analyze the previous one in detail (Figure 2). If we can apply the same detailed graph of gamification (Figure 2) to interactive art (Figure 3), we will have established the close relation between gamification and interactive art. This relation shows that both aim to achieve the same benefits, and we will then explain how to benefit from this relation. Here we demonstrate how seemingly disparate fields can overlap but are in fact closely related.

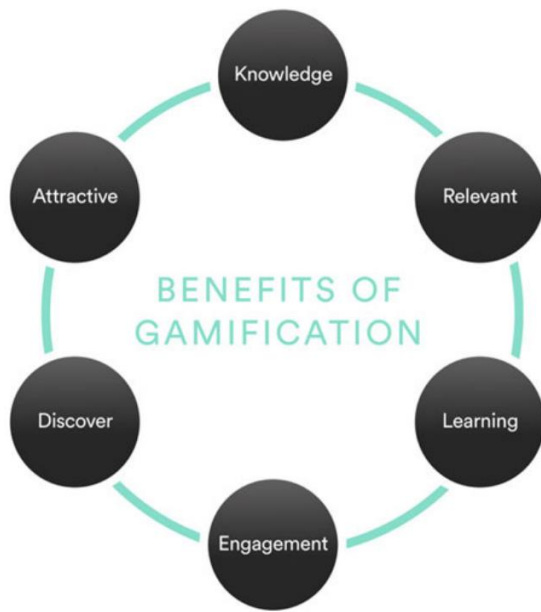


Figure 1: A graph illustrates the benefits of using the concept of gamification in general (Goethe, 2019).

With the researcher's use of the previous graph (Figure 1), the following graph (Figure 2) was produced, which illustrates the benefits of gamification in detail.

Then by applying the gamification graph (Figure 2) to interactive art, the following graph (Figure 3) was produced.

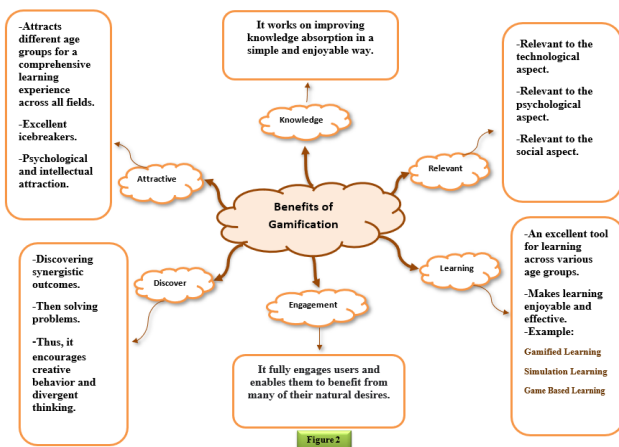


Figure 2 :This diagram was created by the researcher

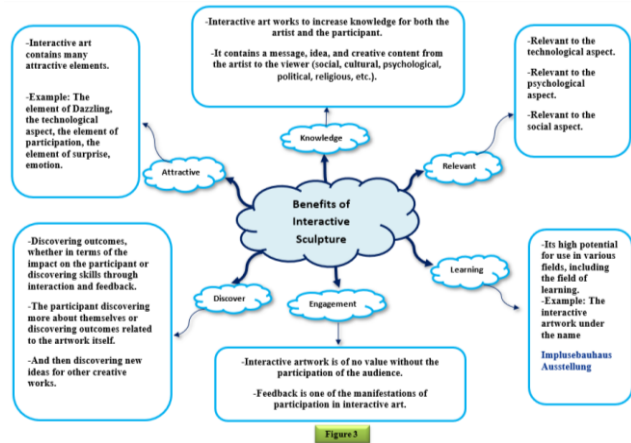


Figure 3 :This diagram was created by the researcher

3- Results and Discussions:

3.1 Analysis of the Chart (Figure 2):

3.1.1 Relevant

Gamification has a strong relevance to the social aspect, the psychological (moral) aspect, and certainly to the technological aspect.

- Gamification is divided into two types: intrinsic gamification and extrinsic or external gamification. Intrinsic rewards in gamification arise internally, where the highest motivators and positive emotions are utilized, such as overcoming challenges, self-learning, autonomy, excitement, surprise, curiosity, belonging, social validation, strength, mastery, renewal of interest and passion, and peer recognition of internal achievements (the psychological (moral) and social aspects).
- The intrinsic aspect here lies in providing a sense of internal progress that takes players on a meaningful journey, regardless of the type of players or the type of fun they experience (the psychological (moral) aspect).
- Stimulating feedback represents the meaning of design for visceral or deep reactions among learners; to experience emotions (Lipnevich and Panadero, 2021) (the psychological (moral) aspect).

- Gamification brings about a strong change in behavior when combined with scientific principles (the social aspect).
- It is relevant to internet and mobile technology.
- It is relevant to big data and augmented reality.

3.1.2 Learning

- Gamification contributes to making learning enjoyable and engaging.
- Learning is considered one of the primary applications of the gamification concept, as it is an excellent means of learning across different age groups, which includes:
 - Gamified Learning
 - Simulation Learning
 - Game-Based Learning

3.1.3 Engagement

The concept of games, which represents the essence of gamification, fully engages users, allowing them to fulfill many of their natural desires, such as learning, social interaction, achieving accomplishments, mastery, and gaining status. Behaviors that may initially seem boring or dry can be transformed into useful and enjoyable activities. Gamification also motivates users to take specific actions and engage in certain behaviors in exchange for rewards.

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3.1.4 Discover

Gamification contributes to discovering synergistic outcomes when combined with big data, augmented reality (AR), and other technologies, which helps solve problems in innovative ways. Thus, games encourage creative behavior and divergent thinking.

3.1.5 Attractive

- Gamification attracts different age groups to experience comprehensive learning that covers all fields.
- This is due to its role as an effective icebreaker, where icebreaking refers to quickly removing barriers between individuals.
- Its appeal lies in its psychological and intellectual impact, as game elements are used in non-game contexts. Game design elements are divided into game dynamics (which influence intrinsic, internal aspects), game mechanics, and game components (which influence extrinsic or external aspects).

3.1.6 Knowledge

Gamification contributes to enhancing the acquisition of knowledge in all its forms and across various fields in an easy and enjoyable way, as game elements are used to increase the appeal of the educational process. Instead of traditional methods, gamification motivates learners to interact and engage, making the learning process more effective and enjoyable, and improving content retention and recall.

3.2 Analysis of the Chart (Figure 3):

3.2.1 Relevant

Interactive art is relevant to the technological aspect, which partially relies on computers and communication technologies. In this context, the software agent used in this type of artwork learns from experience, as it responds to human feedback towards the artwork. Based on these

experiences, the artwork changes its behavior and interaction method with participants, functioning as a generative artistic system. The interactive artwork evolves by modifying the rules of stimulation and response that govern its behavior. This interactive artwork integrates multiple technological techniques such as telepresence, virtual reality, and other advanced technologies.

- Interactive art is also relevant to the social aspect, as it demonstrates the interaction between the message sender and the receiver through a communication process within a defined social framework. In this context, information and ideas are exchanged that motivate individuals and draw their attention to a specific topic or meaningful issue. This communication is based on the principle of participation, where individuals share information, opinions, and mental perceptions, contributing to enhanced understanding and mutual communication.
- Interactive art is relevant to the psychological aspect, as one of its distinguishing features from traditional arts is the role of feedback, which reveals much about the artwork, the artist, and the participant. The role of art here is to convey the artist's messages and ideas to the audience by affecting their emotions and feelings, creating a deep moral and psychological connection between the artwork and the viewer.

3.2.2 Learning

One of the most prominent features of interactive art is its significant ability to be applied in various fields, including the field of learning. In an article by Ryszard Kluszczyński titled *"Interactive Art Strategies"* (Abdelrahman, 2013), a feature known as the "archiving strategy" is mentioned. This strategy involves compiling a collection of artworks within an

archiving system that relies primarily on information and databases as the dominant essential element.

- One prominent example of this type of interactive art is the project conducted in 2009 for Bauhaus University in Weimar, produced by Media Architecture under the name "Impulsebauhaus Ausstellung no1." The aim of this project was to collect all information and data related to Bauhaus members, including their relations with one another and their personal information, serving as an information bank that allows for search capabilities. This extensive data was compiled at Bauhaus University in the form of an interactive table, enabling users to freely interact with it to explore Bauhaus members and learn everything related to them. This project is considered a highly documentary work.

This highlights the extent to which interactive art is capable of effectively utilizing and storing information, allowing it to be accessed in a flexible and easy manner. This type of art facilitates the transfer of information in an interactive and engaging way, making the process of exploring content smoother and more appealing to the user.

3.2.3 Engagement

- Participation is considered one of the most essential elements of interactive artwork, as it involves the audience playing a role in the artwork and granting it its value, since the artwork cannot be complete without their interaction. The definition of interaction highlights this role, and among the most illustrative definitions are those provided by Spiro Kiouis and by Judd Burnham, as previously mentioned.
- Participation in interactive art is manifested through the feedback

provided by the participant, as previously noted.

3.2.4 Discover

The process of discovery lies in uncovering outcomes, whether in terms of the impact on the participant or the identification of their skills through interaction and feedback, which reveal participants' reactions to the artist. This feedback can sometimes lead to altering the course of the artwork at a specific moment within the artistic process. Additionally, this process broadens the artist's horizons, providing a deeper understanding of the audience, which contributes to problem-solving and enhances the participant's experience by fostering self-discovery. Furthermore, this discovery aids in the development of creative ideas for the artwork itself and inspires the artist with new creative concepts for future works.

3.2.5 Attractive

Interactive art is considered one of the most captivating forms of art, as it encompasses numerous distinctive elements that evoke interest. The element of fascination is reflected in its unconventional creative ideas and the use of technological aspects, while the element of participation emerges through audience interaction and active contribution to the artwork. Additionally, interactive art is characterized by the element of surprise, which unfolds over time, alongside other highly appealing elements.

- Time is considered one of the most important elements in interactive artwork, as the composition and content of the work can change at a specific moment due to the participant's movement within the space, highlighting the element of surprise in a fundamental way.
- Moreover, other factors attract individuals and drive them toward certain behaviors, such as tendencies,

orientations, and emotions. Emotions are the driving force that motivates individuals to engage in specific patterns of behavior, and they also contribute to the continuous and stable regulation of the psychological aspect. This makes emotions one of the most significant factors in organizing human behavior and ensuring its stability.

3.2.6 Knowledge

- Interactive art contributes to increasing knowledge for both the artist and the participant, as artists strive to explore the relations between the physical world, the virtual world, and symbolic representation. For example, an artist might study water to understand its nature, which will be represented in computer animations, while another artist might focus on studying plants and microorganisms, incorporating them into her artworks, thereby blending performance with visual art. Dynamic systems often form an integral part of the produced artworks, requiring a significant level of knowledge.
- Additionally, interactive art conveys a message, idea, and creative content that the artist communicates to the participant, whether this message is social, cultural, psychological, political, religious, or otherwise.

Based on the analysis of the graphs and the Numbering matches between 3.1.1, 3.2.1 / 3.1.2, 3.2.2 / 3.1.3, 3.2.3, and so forth sequentially, it is evident that there is a strong relation between gamification and interactive art. Both share several key elements centered on human interaction and the use of digital technologies to enhance experience. Through the analysis of literature and the application of gamification and interactive art concepts, it has been found that both aim to achieve a high level of engagement

and involvement from users or audiences, utilizing elements such as feedback, motivation, and dynamic interaction.

The research also demonstrated that gamification is effectively utilized to motivate specific user behaviors by providing extrinsic and intrinsic rewards such as points, badges, and social recognition. This enhances user engagement with tasks that might otherwise be dry or unappealing. Conversely, interactive art grants the audience an active role in shaping the artwork, making the recipient a part of the creative process, thereby enriching the sensory and psychological experience. Interactive art is highly valued for its ability to stimulate critical thinking and creativity, as it creates an interactive environment that encourages recipients to explore abstract ideas and connect with the profound messages conveyed by the artwork.

The findings of the study indicate that both domains are contingent on a pivotal element: feedback, which serves as a central axis for interaction. Continuous feedback contributes to enhancing and guiding the user experience, whether it is immediate, as in gamification, or linked to a sensory experience, as in interactive art. Moreover, the technologies employed in both fields, such as virtual and augmented reality, play a significant role in creating engaging and inspiring environments. These technologies encourage active participation and generate diverse responses that enrich the overall experience.

Based on the results, it can be concluded that integrating gamification components into interactive art has a positive impact on the user experience, providing broader opportunities for creativity thereby facilitating creativity and enhancing the efficacy of technology in transforming human behaviors. This integration fosters engagement through innovative and interactive means. This integration offers extensive opportunities for improving communication, education, and even marketing.

Furthermore, these interactive technologies can be more effective when used to create experiences tailored to users' preferences.

The discussion also highlights that both gamification and interactive art can be used in different fields to achieve positive results. In the context of education, for example, gamification in education helps to increase learner motivation by incorporating motivational components into the learning environment to eliminate boredom while incorporating an element of constant excitement to stimulate continued learning, and interactive art provides a way to explore educational content through a rich sensory experience. In the context of marketing, gamification has been shown to attract users to products by providing a fun and competitive experience, while interactive art enables companies to create inspiring visual experiences that encourage positive brand engagement.

4- Conclusions

This research has established a tight relation between gamification and interactive art, both sharing fundamental elements that depend on human interaction and digital technologies to enhance the experience. While gamification exploits intrinsic and extrinsic rewards to motivate users and influence their behavior, interactive art exploits dynamic ways to engage the audience and draw them into the center of the creative process.

The results suggest that the combination of gamification and interactive art can create innovative and unique experiences that inspire and enrich participant engagement. Feedback is an essential component in improving the quality of interaction in both domains, whether through direct or sensory mechanisms such as in gamification or interactive art. Moreover, technologies such as virtual reality, augmented reality, and generative technology show significant potential in enhancing this relation

and creating engaging and inspiring interactive environments.

The research recommends exploring more possibilities for the integration of gamification and interactive art in diverse fields such as education and marketing to reach motivational and creative outcomes to enhance human interaction in innovative and diverse ways.

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