

The Metaverse and Digital Art for Artistic Inclusion Through NFTs

El metaverso y el arte digital para la inclusión artística a través de NFT

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Summary. This work explores the metaverse, digital artwork, and Non-Fungible Tokens (NFTs) potential to promote art inclusion and digital gap reduction. An innovative lead is being analyzed: a workshop designed to train emerging artists who create and may commercialize digital artwork through NFTs. The participants were instructed to offer and sell their work in decentralized platforms like OpenSea and manage digital wallets like MetaMask. This workshop ended with an expo in a virtual gallery created on Spatial.io. The insights showed that, although emerging technologies offer unprecedented ways to artistic monetization and expression, the adoption of these technologies requires an approach not only to access the tools but to develop skills, community support, and overcome systematic barriers. This project stands out as practicing digital literacy for the artists to get economic autonomy and to change global views on creativity.

Keywords: Metaverse, NFT, blockchain, inclusion, technologies in education.

Resumen. Este trabajo explora el potencial del metaverso, las obras de arte digitales y los tokens no fungibles (NFT) para promover la inclusión artística y la reducción de la brecha digital. Se analiza una iniciativa innovadora: un taller diseñado para capacitar a artistas emergentes que crean y comercializan obras de arte digitales mediante NFT. Se instruyó a los participantes para que ofrecieran y vendieran su trabajo en plataformas descentralizadas como OpenSea y gestionaran billeteras digitales como MetaMask. Este taller finalizó con una exposición en una galería virtual creada en Spatial.io. Los hallazgos mostraron que, si bien las tecnologías emergentes ofrecen formas sin precedentes de monetización y expresión artística, su adopción requiere un enfoque no solo para acceder a las herramientas, sino también para desarrollar habilidades, el apoyo de la comunidad y superar las barreras sistémicas. Este proyecto destaca por su práctica de la alfabetización digital para que los artistas obtengan autonomía económica y transformen la perspectiva global sobre la creatividad.

Palabras Clave: Metaverso, NFT, blockchain, inclusión, tecnologías en educación.

1 Introduction

The intersection of technology and art expression have been a constant among history, generating new ways to create and divulge. Before photography until the actual digital era, technological tools have continuously redefined art limits, ending in the emerging of digital art as a dynamic media constantly evolving. However, this technological evolution has also shown a significant disparity between access and training, known as digital gap ("Digital art | EBSCO Research Starters," n.d.).

Digital gap makes reference to an access inequality to technological resources and skills, frequently influenced by socioeconomic status, geographic location, and some other factors (Salinas and Dávalos, 2024). On the other hand, digital inclusion means "the activities necessary to ensure that all individuals and communities, including the most disadvantaged, have access to and use of Information and Communication Technologies" (Reisdorf and Rhinesmith, 2020). It's important to acknowledge that digital inclusion must consider several barriers that individuals have to face while interacting with digital technologies.

In this context, the idea of a workshop for training artists so they can offer and sell their artwork emerges as an innovative effort to bridge this gap. The objective of this project is to empower potential artists by providing

practical experience with metaverse, NFTs and blockchain technologies. The workshop not only seeks to introduce new creative tools to artists, but to endow them with knowledge required to navigate and prosper in the emergent digital economy.

Also, we need to understand that technology, by itself, can't guarantee inclusion. Although it offers a huge potential to expand access and opportunities, its existence doesn't ensure equal adoption. As Reisdorf and Rhinesmith (2020) highlight, digital inclusion must be considered a core component of social inclusion, which requires going beyond mere access to technology. Initiatives, like this one, to be really effective in bridging a digital gap, must go further than just a device or platform provision (Digital Inclusion in Education, n.d.). The focus of the workshop, by including detailed training about the use of OpenSea and Metamask, aligns directly with this need, recognizing that the ability of using tools in a significant way is as important as access to those (Carvalho et al., 2023).

1.1 Immersive Spaces

To fully understand the objective of this project, we need to create a solid base by clearly defining what metaverse and digital art are, and so their bond.

So, metaverse or immersive space is a digital 3D space mixed with the real and virtual world, it's a virtual universe created beyond the real world. This term was first coined in a science fiction novel called cyberpunk. The fundamental characteristics of the metaverse include (Zhang et al., 2022):

- A compound of technologies: it is a multiple emergent technology convergence such as Extended Reality (XR), Artificial Intelligence (AI), and blockchain.
- Real and virtual world concurrency: Gathers virtually improved reality with persistent virtual space, almost deleting the gap between both worlds to get a more immersive and multisensorial experience.
- Immersive experience: Takes advantage of virtual reality (VR) and augmented reality (AR) to offer highly realistic and involving experiences.
- Decentralization: It's built over blockchain technology, emphasizing user property over data and digital assets, reducing centralized platform dependence.
- Virtual economic system: Holds a full economy where users can commercialize with digital coins (cryptocurrency), buy virtual goods and invest in digital assets.
- Real time persistence and connectivity: Operates like a virtual world in continuous evolution that doesn't stop when users close their session, allowing events and activities to persist.

There are many applications for metaverse, going from virtual social interaction, digital asset commerce (Andrés, 2023) to immersive education and virtual offices (Zhang et al., 2022).

1.2 Digital art

Referring to digital artwork, it is a kind of visual artwork created or presented using information technology. This genre involves a wide range of media, including digital sculpting, digital cinema, digital beauty arts, digital illustration and digital architecture ("Digital art | EBSCO Research Starters," n.d.). It has transformed the way art is created and it's being experienced, allowing sound, light and video integration within facilities that can be shared and divulged through digital platforms (Damodaran, 2024).

This way, metaverse enables a natural and immersive environment to exhibit and to appreciate digital artwork, granting new ways of interaction going beyond traditional physical galleries (Colella, 2022).

1.3 Blockchain and NFT

To better understand digital artwork and its value as an unique asset, it is necessary to explain what blockchain and Non Fungible Token Technologies are. Thus, blockchain is a system based on the codification and encryption of information (Rivero Moreno, 2024) which takes as a distributed and decentralized append-only database. This kind of system replicates the information across several computational devices (nodes), however this information does not belong to a person/computer but to a single entity conformed by all devices where the blocks (fragments of all the information) are held (Carvalho et al., 2023).

Also, Non Fungible Tokens (NFTs) is an emerging technology provided with the advantages and capabilities of blockchain, becoming a revolutionary digital development platform to represent the ownership and authenticity of digital assets such as artwork, collectibles, and intellectual property (Barua et al., 2025). NFTs, besides previous

examples, can be used in several other contexts like: Issuance and management of certificates, protection of rights, badges, and many others (Di Salvo, 2023).

In addition, NFTs address a big challenge about digital artwork: easy replication and lack of shortages on digital matters. By assigning an unique and verifiable identifier to each work of digital art on blockchain, NFTs turn them into unique pieces, which permits artists to keep the ownership and control of their digital creations, defining terms of property, licence and rights of use (Cole, 2024). Property can be verified through blockchain code, the unique TokenID and contract address. Furthermore, metadata includes information about origin, date, time, and devices used, all of them essential to prove ownership of the original work of art. (NFT Copyright, Ownership & Verification - Artist Guide | Adobe, n.d.).

2 Methodology

The methodology consisted of a workshop centred on guiding participants to create digital art specifically designed to turn it into a NFT. This practical approach promoted a deep comprehension about digital authorship, tokenization and property.

Then, to enable artists to commercialize their work, they were taught to use blockchain key tools. One of them was Metamask, which is a crypto wallet software used to interact with Ethereum blockchain. It has many capabilities like managing and storing account information, making transactions, sending and receiving cryptocurrencies and tokens based on Ethereum (Mai, V. P. G., & Nguyễn, H. V. et al., 2023).

Another of these tools is OpenSea, the biggest NFT commerce platform, which can be considered as a decentralized market built over blockchain technology. Some advantages of this platform are a friendly interface to make buying and selling NFTs in different categories (Nadini, M., Alessandretti et. al., 2021). Participants learned all the steps to mint including connection of Metamask cryptowallet to the platform, uploading digital art files, naming and describing NFTs and to pay associated fees known as “gas rates”. They learned, as well, to set sales with fixed prices and programmed auctions.

3 Developing the immersive experience

Once the participants uploaded their digital art on OpenSea, it was time to exhibit all those works in a virtual gallery, so people could admire them and give notice of the effort, creativity and time spent. That being said, the next step consisted of designing and populating the virtual gallery.



Figure 1. Participants on the immersive experience using VR.

This way, the chosen tool for this task was Spatial.io. This platform is recognized for enhancing millions of interactive worlds and creating virtual and augmented reality immersive environments (Spatial Systems, Inc., s.f.). It offers friendly features for developing spaces without effort, also, it can handle 2D, 3D and video files uploads, allowing artists to exhibit a wide variety of art work inside this virtual space (Zhao, 2024).

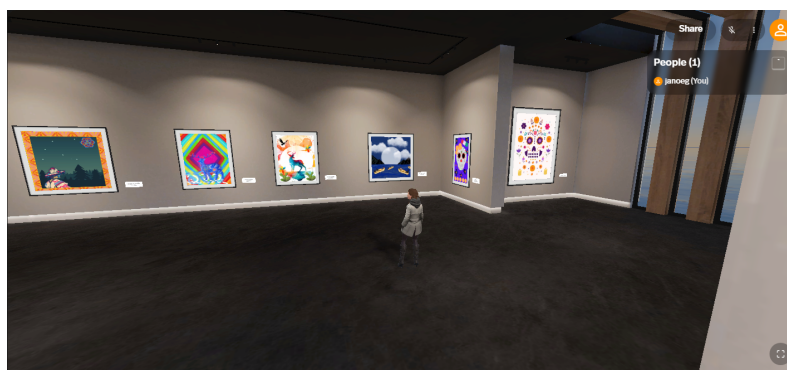


Figure 2. Avatar viewing the VR Gallery view into Spatial.io platform.

Experiences created on Spatial.io can be published directly on the Web, VR/AR and mobile devices, which means users can access Spatial worlds on every device, anywhere, without downloading anything (Hidayati et al., 2024). The 3D environment provided by this platform, surpasses limitations of traditional flat screens and offers new perspectives for presenting art.

4 Experience results

We find that the majority of attendees are from technology degree subjects as shown in workshop engagement data with 74% from technology undergraduate programs. Students enrolled in Informatics programs are most dominant (52 %), after Computer Systems (22 %). That reflects a keener interest in NFTs and blockchain in these sectors. Fifteen percent of the participants were from the field of Economics, 11% from other disciplines. Professor Participation was low (7.6 %), and concentrated mostly around CS and Economics.

Table 1. Participants by academic program.

Academic program	Students	Professors	Total	% of Participation
Economy	12	2	14	15%
Informatics	45	3	48	52%
Computer Systems	18	2	20	22%
Other	10	0	12	11%
Total	85	7	92	100%

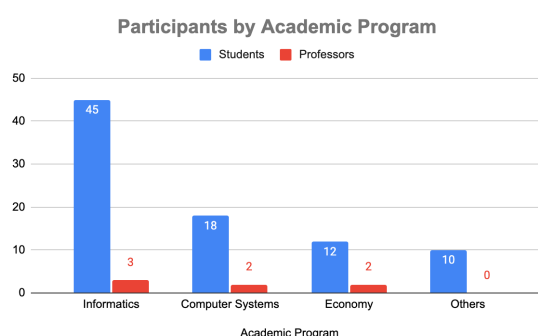
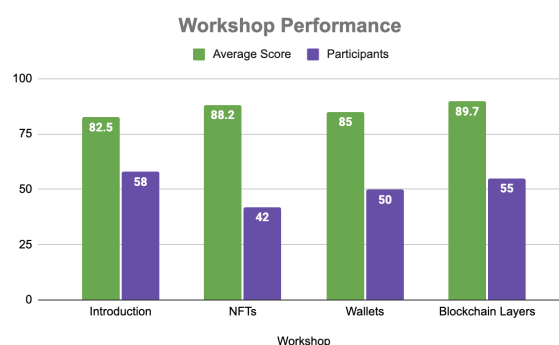


Figure 3. Participant distribution (students and professors) across academic programs.

The average performance scores increased from 82.5% (on the Introduction workshop) to 89.7% (on the Blockchain Layers workshop), evidencing a satisfactory learning curve for technical subjects such as wallets and blockchain layers. On the first day of that workshop, 30% of initial responses listed “centralized system” as one of the defining characteristics of blockchain. However, by the Blockchain Layers workshop, 92% were able to correctly identify these three core layers.

Table 2. Workshop performance.

Workshop	Score	Participants
Introduction	82.5	58
NFTs	88.2	42
Wallets	85	50
Blockchain layers	89.7	55

**Figure 4.** Average participant scores per workshop topic (Introduction, NFTs, Wallets, Blockchain Layers).

5 Conclusions

The hands-on workshop gave artists the tools needed to thrive in the digital art world. We walked them through the entire process - from creating digital artwork to selling it as NFTs on blockchain decentralized platforms. By embracing NFT technology, artists discovered new ways to earn money from their work, reach international audiences, and protect their digital creations through verifiable ownership; all of which can significantly increase an artwork's value.

This workshop served as an inclusive gateway into this emerging field. Encouraging artists to access this experience, narrowing the digital gap by teaching/learning skills like digital art creation using different software, NFT minting, crypto wallet management, and marketplace navigation.

While the digital art revolution brings exciting opportunities, we can't ignore the real challenges it creates when it comes to equal access, things like language differences, spotty internet connections, or simply not having strong enough WiFi (connectivity needs and robust internet access). The Metaverse is particularly tricky this way as a double edge sword; on one hand it can be incredibly inclusive by letting people connect across distances and time zones. But at the same time, it demands better computers and a more reliable internet which ends up excluding others.

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