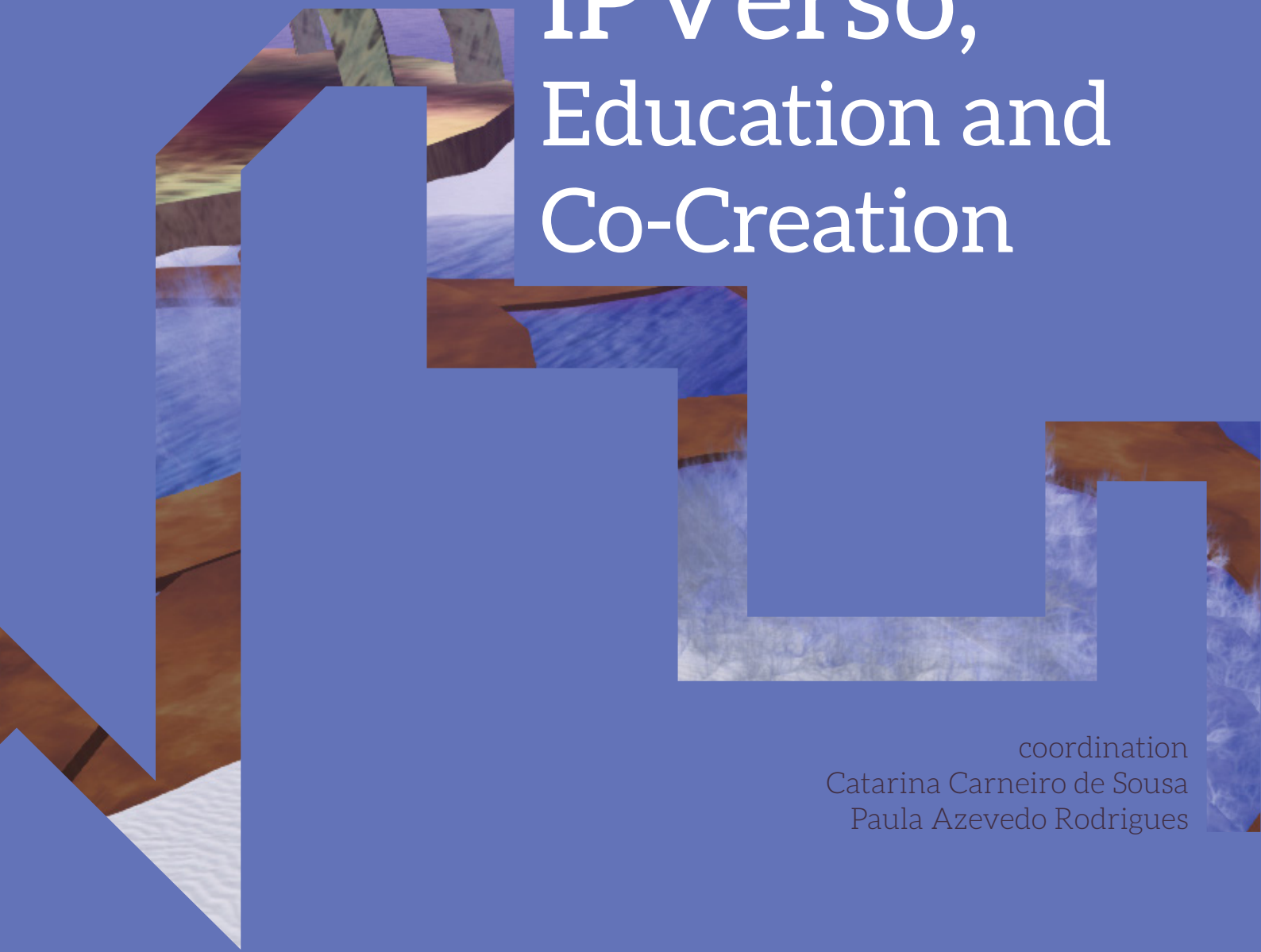
IPVerso, Education and Co-Creation



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IPVerso, Education and Co-Creation

Title IPVerso, Education and Co-creation

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Typeface Aleo

Date October 2023

Place of publication Viseu

Publisher Polytechnic Institute of Viseu

ISBN 978-972-8765-37-8

DOI 10.34633/978-972-8765-37-8

Cofinanciado por

CONTENTS

Acronyms and Abbreviations

3D: three dimensions
APM: Artes Plásticas e Multimédia (Art and Multimedia)
CVE: Collaborative Virtual Environments
CCVE: Collaborative Creative Virtual Environments
CI&DEI: Centro de Estudos em Educação e Inovação (Centre for Studies in Education and Innovation)
CISeD: Centro de Investigação em Serviços Digitais (Digital Services Research Centre)
ESEV: Escola Superior de Educação de Viseu (Viseu School of Education)
ESTGV: Escola Superior de Tecnologia e Gestão de Viseu (Viseu School of Technology and Management)
IPV: Instituto Politécnico de Viseu (Polytechnic Institute of Viseu)
MEEVTEB: Mestrado em Ensino da Educação Visual e Tecnológica no Ensino Básico (Teaching of Visual and Technological Education in Basic Schooling)
MOIA: Metodologias de Observação e Intervenção Artística (Artistic Observation and Intervention Methodology)
OS: OpenSimulator.
ABER: Art-Based Educational Research
Prim: Primitive object
Sim: Simulator
SL: Second Life
TDM: Tecnologias e Design Multimédia (Multimedia Technologies and Design)

Glossary

3D: three dimensions, usually refers to the digital simulation of three-dimensional space.

Grid: a rectangular grid comprising a collection of networked servers, some of which are simulators, which implement the presentation of virtual regions.

Mesh: a collection of vertices, edges and faces that define a 3D shape.

Primitive object (Prim): an object made up of a single piece. In the SL and OS grids, these are individual objects that can be constructed using the interface's construction tool.

Simulador (Sim): the word simulator can have different meanings in different contexts. In this book we use the term in the sense of a virtual region simulated digitally in 3D, usually integrated into a grid of several regions.

Skybox : In platforms such as OpenSimulator, any building with enough space to be visited by avatars, located at altitude, invisible from the Sim's terrain, is a skybox.

Terraform: the possibility of modelling 3D terrain

Viewer: an application used to access the virtual world.

What is the IPVerso?

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Abstract
In this chapter we will explain the nature of the IPVerso simulator and explore its context and its development as a result of a co-creative activity. Furthermore, we will also provide a brief explanation of what is meant by Metaverse and Creative Collaborative Virtual Environments. We will address the different shared creative processes that have emerged from various workshops and the topics we have discussed in our seminars. We will demonstrate that this simulator and its associated exhibitions are the outcome of these co-creative processes, thereby proving the potential applications of the Metaverse within an academic context.

Keywords:
Metaverse, Creative Collaborative Virtual Environments, Co-creation, IPVerso.

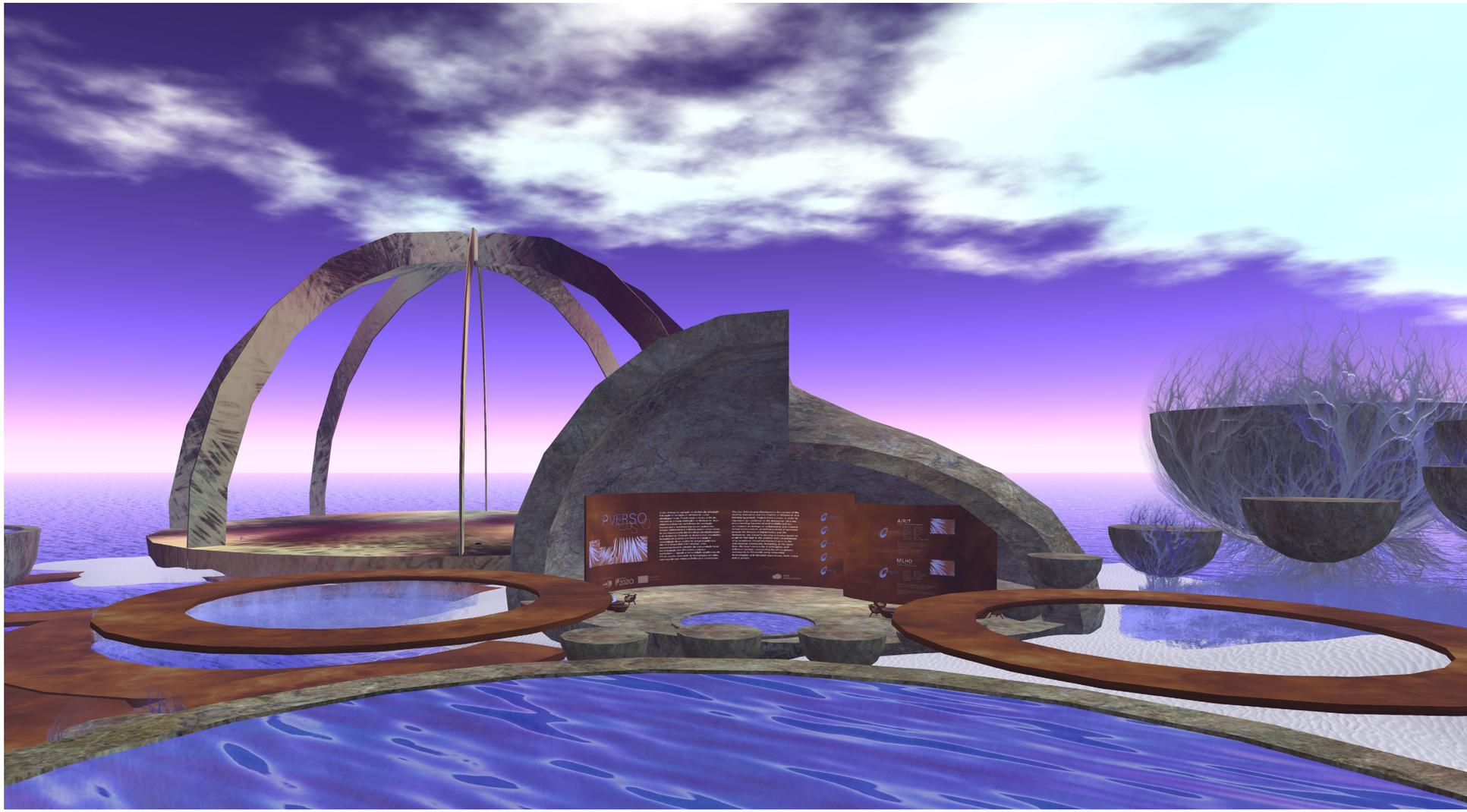


Fig. 1 Overview of IPVerso, featuring the landscape by Catarina Carneiro de Sousa, architecture by Mariana Sá, visual identity by Paula Rodrigues, with application by Catarina Carneiro de Sousa.

Introduction

Within the scope of the IPV Inova e Inclui Project, particularly in the activity titled "Educação e Cocriação no Metaverso numa abordagem mista"(Education and Co-creation in the Metaverse using a blended approach), the Instituto Politécnico de Viseu (Polytechnic Institute of Viseu - IPV) introduced its Metaverse Simulator– the IPVerso - on February 28th, 2023.

The construction of this simulator involved the active contribution of students who attended the workshops (Eustáquio, 23; Gonçalves, 23a; Gonçalves 23b; Rito, 23; Sousa, 2023a) related to this activity. It is currently hosted in Craft-World, a grid located on the OpenSimulator platform. The IPVerso is the IPV's simulator (Sim) within the Metaverse.

But what does this really mean? This signifies a 3D digital environment that exists online, and that can be visited by multiple users simultaneously. Within this environment, users can interact, observe their actions and those of others fellow virtual world users, and work together.

It also provides the tools for creating 3D objects, making them interactive via scripts, uploading images, sounds, animations and 3D models, among other features. It is therefore a Collaborative and Creative Virtual Environment (CCVE) that enables collaborative work and the creation of original artifacts.

Additionally, it allows students to develop artistic creations based on shared creativity, that is, creative processes developed by multiple creators who collaborate synchronously or asynchronously from different locations, employing diverse approaches. These processes stimulate the development of ever-changing creative flows. What do we aim to achieve with this Sim developed by the IPV? Primarily, we aim to promote remote co-creation. In other words, we wish to promote creative collaboration, which is a characteristic of this type of platforms. This way, we can empower students to meet the new challenges arising from the digital transition by developing creative, technological, conceptual and collaborative skills within virtual environments. This may contribute to fostering student resilience and their ability to adapt to the new work environments emerging in the digital age.

To accomplish these goals, we rely on active teaching and learning methodologies that revolve around students, anchored in co-creative projects that involve workshops and seminars, using a blended or hybrid approach that combines both remote and in-person teaching.

1. Framework

The term "Metaverse" has recently regained prominence in the media. This word was coined by Neil Stephenson in is 1992 novel "Snow Crash". In this science fiction book, the Metaverse was depicted as a fully immersive virtual reality environment, accessed via head-mounted display devices, where users interacted with each other and the virtual world through their avatars.

With the advent of the new millennium, the term found its way into technical and scientific literature to refer to multi-user immersive environments and soon extended to monitor-based platforms such as Second Life (SL) and OpenSimulator (OS).

We use the terms Metaverse, virtual worlds, or virtual environments to designate computer-generated three-dimensional physical spaces that can be experienced simultaneously by various individuals (Castronova, 2005). Boellstorff (2010) suggests three key elements when considering virtual worlds: they are places, inhabited by people, and made possible by online technologies. The term that may be most fitting to describe these spaces is "Collaborative Virtual Environments" (CVE), defined as digital and distributed virtual spaces that support collaborative activities (Churchill, Snowdon & Munro, 2001).

It is worth noting that recently the term "Metaverse" has been mostly used to refer to virtual reality platforms that use head-mounted devices. However, SL and OS platforms are only available for monitors. As yet, our institution does not possess head-mounted devices, and most students still do not have access to them. Therefore, a monitor-based platform proves easier to work with and is more inclusive as well.

Our Sim, i.e., our virtual space, is located within the Craft World grid, an OS-based grid. This platform closely resembles the SL platform, in both its visual and procedural aspects. This platform was chosen because it facilitates user collaboration in the creation of a wide variety of artifacts, and both the SL grid and the various OS grids host a highly productive and diverse artistic community (Sousa, 2017).

A grid is a collection of several Sims existing within the same navigable virtual space, accessible through an avatar registered on that grid. There are several grids based on the OS platform, and Craft World is one of them. By registering an avatar in Craft World, users can visit all the active Sims on that grid and share materials with all the other users, among other possibilities.The key feature of a CVE is its capacity for enabling collaboration, even though collaboration and creation have different potentialities.

While CVEs generally increase user engagement, not all of them allow creative control over content. Some may offer limited customization of default content or restricted file import and export options, but they do not allow users to fully create their avatar and/or their virtual world. This is precisely where SL and OS grids differ from typical online multiplayer games - these platforms not only allow collaborative activities but also permit substantial creative contributions from their users. They are Creative Collaborative Virtual Environments (CCVE), i.e., 3D digital environments accessible to multiple users simultaneously who can interact and collaborate with each other, build original artefacts, modify/customize standard content and/or materials shared by other users, and share their own creations (Eustáquio & Sousa, 2018).

The OS platform allows straightforward 3D construction within the platform and the integration of elements developed externally. This facilitates working with heterogeneous groups of students, accommodating different digital creation skills (or no skills at all).

2. Shared Creative Processes

When discussing co-creation, we are referring to creative processes where creation cannot be confined to a single author. Various components of each project are crafted by different authors and producers working together towards a flexible, dynamic and perpetually unfinished body of work.

We can consider three shared creative processes - collective creation, collaborative creation, and distributed creation. In this context, we are specifically referring to creative processes and not methodologies used to organise work groups.

It is important to distinguish what we refer to as collective creation from the common use of the word "collective", which typically refers to a group of individuals acting together in some way. What we aim to describe here is a particular creative process that in no way compromises other different and significant aspects associated with the word "collective".

Collective creation, as we define it, is a

creative process in which participants act as a single creative entity. This is a fully co-creative, and extremely horizontal process, where every participant is an equal partner. Achieving this equality in large or medium-sized groups is quite difficult. An equal partnership basis is more likely to succeed in a cellular structure, where each participant relinquishes their role as authors in favour of the collective authorship of the group.
This was the case in the projects carried out during our co-creation workshops in virtual environments, conducted in conjunction with the “Mestrado em Ensino da Educação Visual e Tecnológica no Ensino Básico” (Teaching of Visual and Technological Education in Basic Schooling - MEEVTEB), in the inaugural edition of the Virtual Environments Co-creation Workshop (Sousa, 23a; Sousa, 23b). Students worked in pairs, and each group developed a joint art installation signed by all the authors, with no distinction being made between the artistic contributions of each member.
Collaboration is another shared creative process. When we refer to collaborative creation, we are not addressing the term "collaboration" in its general sense. Instead, we try to describe a particular form of joint creation that differs from the previous process. Here, each author retains individual authorship, and it is possible to roughly discern the work of each author, even though they may intermingle, making it challenging to define the boundaries between them. This form of creation often takes the shape of a dialogue between authors, where each creation is a response to another creation. This is how students from “Artes Plásticas e Multimédia” (Art and Multimedia - APM) worked during the second edition of the Virtual Environments Co-creation Workshop, which was taught in articulation with the APM course “Laboratório de Arte e Multimédia I” (Art and Multimedia Laboratory I - LAMI). These students formed small groups that worked in teams with well-defined tasks assigned to each element. The work conducted by each element had to be explicitly detailed and credited in the final LAMI reports.
This was also the case of the collaborative work involving Catarina Carneiro de Sousa (a teacher and digital artist), Mariana Sá (a student and architect), and Paula Rodrigues (a teacher and designer). Each worked in response to the work of the others. Catarina Carneiro de Sousa created the landscape features (ground, sky, water), and then Mariana Sá built the architecture. In response, Catarina Carneiro de Sousa created the vegetation and exhibition furniture. Later, Paula Rodrigues created the image of the IPVerso, based on the landscape and architecture of the place. In response, Catarina Carneiro de Sousa implemented the applications within the virtual environment (Figure 1).
This experience has stimulated our interest in exploring the evolution of communication design within the context of virtual environments. Rick Poynor, in a short article titled “A Report from the Place Formerly Known as Graphic Design” (2011), identified, at that time, the need to recognize the growing scope of the design field. Since it extends beyond printed media, it positions itself as a more open, less definable territory, "an expanded, integrative, transmedia discipline of communication and expression" (Poynor, 2011, p. 32) where designers engage with hybrid forms of communication.The use of similar software as an integral part of creative and sharing processes blurs the compartmentalization typically associated with specific mediums and materials such as painting, sculpture, video, drawing, or photography. Changes are not only seen from the perspective of the 'borderless' designer who uses different languages, media and supports, there are also noticeable changes in terms of the relationship with design artifacts.
Interactions with communication design in the physical world are complemented by interactions mediated by digital technology. They often rely on metaphors that, as Manovich (2001) pointed out, stem from the world of publishing (such as pages or text columns) and the language of cinema (spatial representation, narrative, or the concept of point of view). Reception and interaction have been identified as crucial, striking in contemporary art or digital design and central in the case of virtual worlds. In the design of artifacts for the physical world, interaction conditions are contingencies that designers consider to guarantee and, to some extent, control the interaction. In this environment, those interacting with the artifacts wield additional power, they are not confined to the laws of physics, can overcome distances and change perspectives in seconds. There seems to be a challenge here for the designer accustomed to editing content, prioritizing information, and often working to control the order in which the different elements are presented. There appears to be greater freedom, fewer parameters to respect, such as determining the height at which road signs are placed relative to eye level or the font size used for

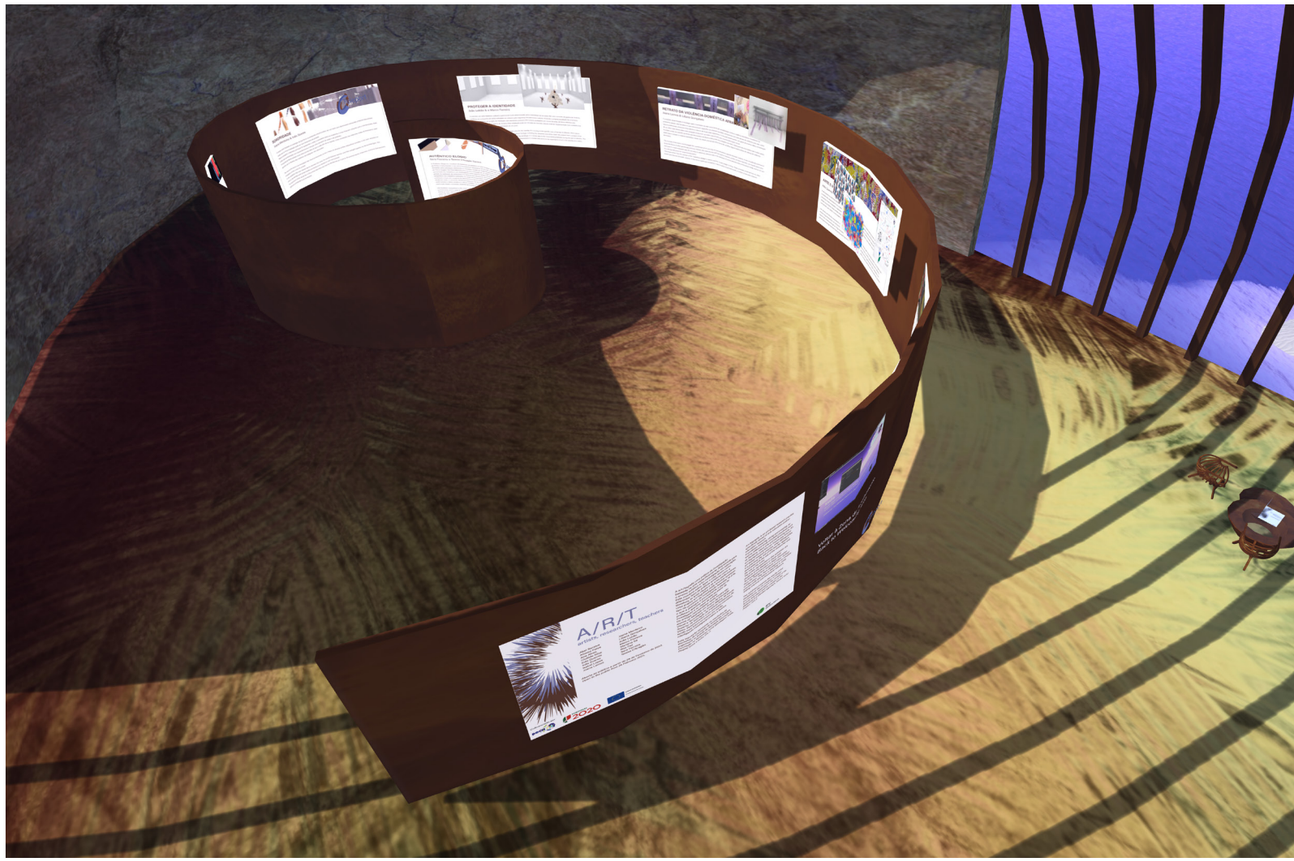
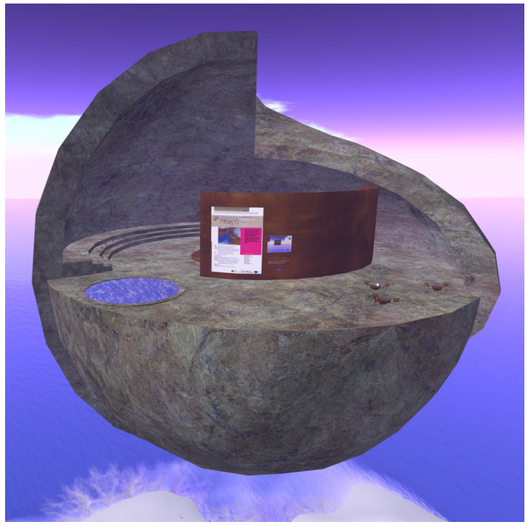
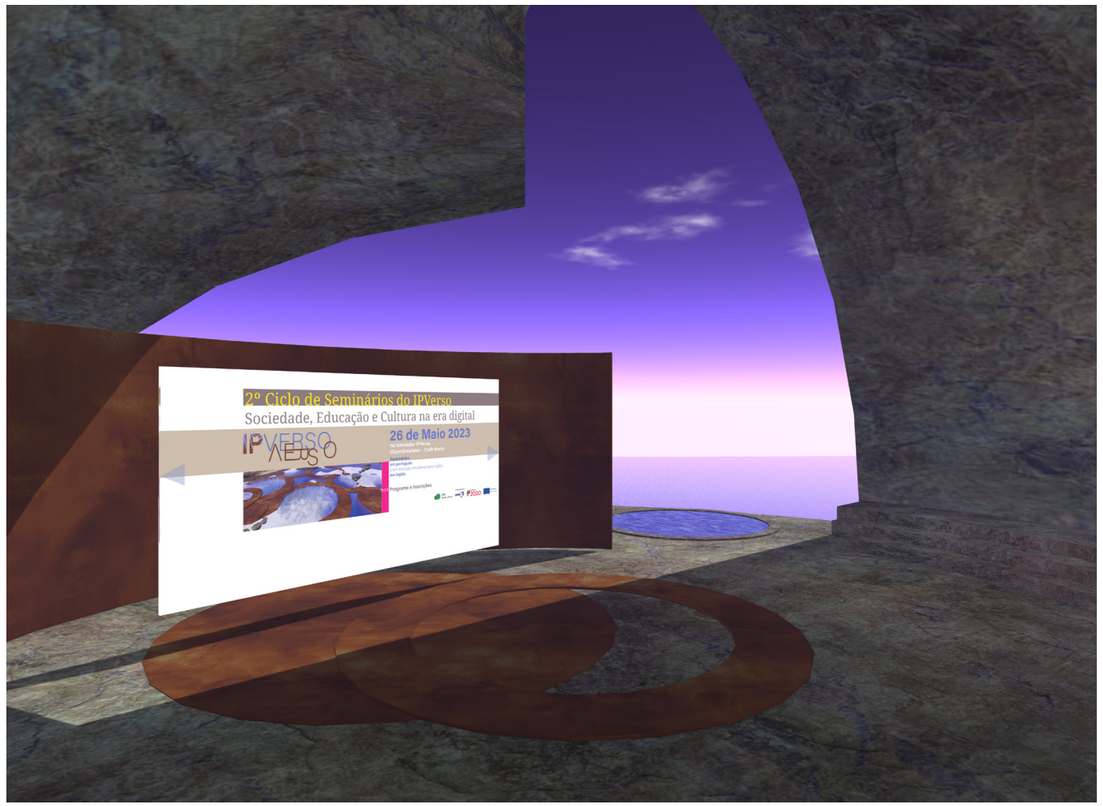


Fig. 2. Main exhibition hall with the A/R/T exhibition and its respective exhibition furniture.

proper long-distance visibility. However, we cannot forget that design artifacts often exist simultaneously in tangible and intangible forms, disseminated in physical format after printing, in digital format through websites, social networks, and present in virtual worlds like the IPverso. The need to address all these practical issues, coupled with the demand for growing conceptual and perceptual flexibility to transition from the real to the virtual in an existence increasingly mediated by technology, along with a growing awareness that design is not for but with, serve as stimuli for reflection and the development of new experiences.
The way Mariana Sá implemented the materials reminded Catarina





Figs. 3 e 4. Auditorium of the IPVerso, architecture by Mariana Sá, posters by Paula Rodrigues.

Carneiro de Sousa of Richard Serra's work. Consequently, a considerable portion of the exhibition furniture was inspired by this artist's work (Figure 2).
¬¬The main inspiration for the environment stemmed from Deleuze and Guatarri's concept of Rhizome (Deleuze & Guatarri, 2008). This concept is based on multiplicity and opposes binary and dualistic thinking, such as subject/object differentiation. It is essentially grounded on the inherent connectivity of knowledge production. In biology, a rhizome is a stem that resembles a root capable of growing underground, close to the ground, in water, or in the air. It grows horizontally and typically connects different tubers. Deleuze and Guatarri use this structure to depict the process of the formation of contemporary culture. Although their text dates back to the 1980s, it proves very useful in describing cultural processes within the digital age and the Internet era. This constant interconnection, the use of hyperlinks, which represent teleports from one space to another, gives rise to a relationship that extends far beyond our small community and our modest simulator.
Which brings us to a third form of shared creation, particularly typical of the digital age: distributed creation. This occurs in projects where the creativity of a large number of participants contributes to an already existing body of artistic material. In other words, we use the creations of someone who distributes them with the proper licenses for use and adaptation, and in return we distribute material to the community. It's a perpetual creative flow without beginning or end, in which we participated with this project. For instance, our contributions include sharing avatars developed by Meilo Minotaur and parts of avatars provided by the IPVerso team itself.
Our students have also benefited from the creative generosity of the Craft-World community, having used and/or adapted materials from the Noha Sim, as well as textures, scripts, etc. shared by the virtual community.

3. IPVerso

Our simulator in the Metaverse is named IPVerso. It is a 3D space that can be navigated using an avatar and teleporters connected to objects existing in the environment. It includes a Welcome Zone, offering a brief presentation of the activity, and teleporters to the different buildings. Additionally, there is an Auditorium where slideshows, videos and live streaming can be enjoyed (Figures 3 and 4). Two Arenas (one larger, the other one smaller) will be used for performances, parties, or other activities that involve a more performative dimension by the avatars.
There is also a zone for sharing avatars, currently featuring avatars generously provided by Meilo Minotaur. We also share basic skins and shapes, i.e., textures and forms for avatar bodies. There are also landmarks for other Sims where elements used for avatar customization can be found (Figure 5).
We have incorporated a viewpoint, where users can get an overview of the entire ground area within the simulator. Additionally, there is a permanent main exhibition hall integrated into the simulator's landscape, and several other variable exhibition halls positioned at different altitudes, exclusively accessible through teleportation, and available to all users.

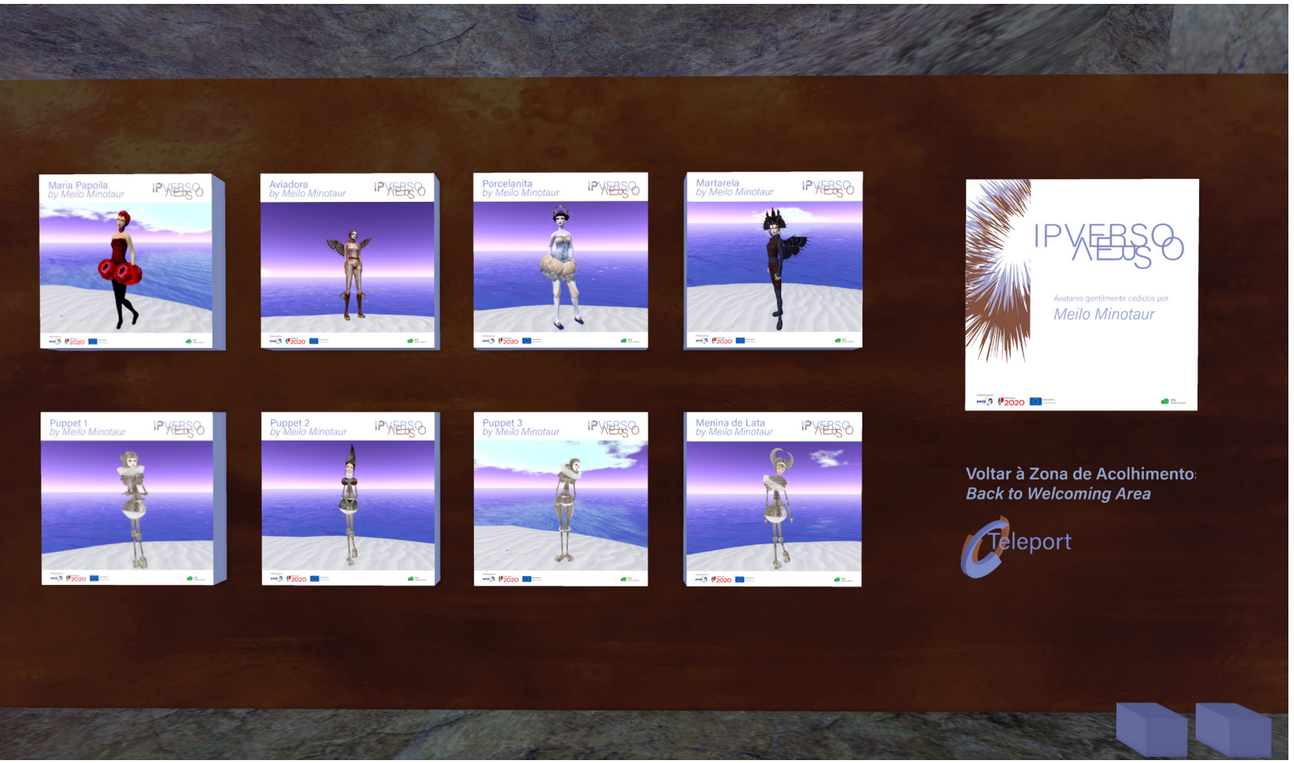


Fig. 5. Avatars provided by Meilo Minotaur, available to our visitors for free

The simulator also includes three Workshops (Construction, Optimization and Animation, and Scripts) accessible exclusively through teleportation. However, this option is limited to the participants of the workshops. This is one of the interesting capabilities of this platform – it allows for a 3D space that users can navigate using an avatar but also extra zones that can be accessed via teleportation links, enabling open rooms accessible to the general public and specific rooms designed for particular groups.

4.The structure of this book

The book is composed of three sections: Workshops, Exhibitions and Seminars, which constitute the main sub-activities we had the opportunity to develop. Only those carried out in the 2022/23 academic year are documented here (new sub-activities are scheduled for the beginning of 2023/24).

In the first section we provide a concise description of the co-creation workshops held on virtual environments, optimization of 3D models, scripting, sound design and animation.

The group of students we worked with was quite heterogeneous, comprising students from different courses offered by the IPV, spanning different years and cycles, and teachers from the same institution. The different installations of the IPVerso and the various exhibitions were outcomes stemming from the collaborative work carried out in those workshops.

The second section serves as a catalogue showcasing the exhibitions on display at the IPVerso: A/R/T, Artists, Researchers & Teacher, an exhibition featuring works by MEEVTEB students who participated in the Co-creating Virtual Environments Workshop (Sousa, 23b); MILHO, an exhibition featuring illustrations depicting legends and tales of yesteryear. This exhibition was designed in the IPVerso and intended to be developed in the tangible world (Sousa & Basílio, 2023); Presence, featuring works by APM students who attended the diverse workshops offered (Sousa, 2023c). Finally, the teachers who engaged in the different workshops also developed their own exhibitions: Haven, an installation created by Valter Alves and José Cardoso, teachers at ESTGV (Alves & Cardoso, 2023); and Bonecos no IPVerso, a creation by Sofia Figueiredo, a teacher at ESEV (Figueiredo, 2023).

The third section of the book documents two seminar cycles conducted during this activity. The 1st IPVerso Seminar Cycle – Welcome to the IPVerso, marked the public unveiling of the simulator. The presentation occurred in a hybrid format, simultaneously in the auditoriums of the ESEV and the IPVerso. This section includes seven chapters associated with these seminars. The present chapter and the presentations of the A/R/T and MILHO exhibitions, showcased in the Exhibitions section, will be detailed in other sections.

The second seminar held in the IPVerso, titled 2nd IPVerso Seminar Cycle – Society, Education and Culture in the Digital Age, took place entirely online, combining the OpenSimulator platform with the Zoom platform. We were delighted and honoured to host a group of personalities, from both Portugal and Italy, who are dedicated to the study of the digital age. We could listen to their contributions and discuss the impact of digitalization on society, education and culture. Some chapters of this book have originated from these seminars, notably: "Museu do Metaverso" (the Metaverse Museum), (Galvani, 23), the City of Women (Colicigno, 23) and "Impactos da era digital" (Impacts of the digital age) (Coutinho, 23).

Conclusions

In this opening chapter, we introduced our Metaverse simulator, called IPVerso, an immersive 3D environment that can be explored using an avatar. This space encompasses diverse functional areas, ranging from the Welcome Zone, designed to provide a brief introduction to the available activities and access to the different buildings, to the Auditorium, where slideshows, videos and real-time content transmissions are offered. The two Arenas included are designed for hosting shows or parties. Additionally, there is an area where avatars and any resources deemed relevant to their construction can be shared.

The viewpoint provides a comprehensive panoramic view of the entire ground area of the simulator. As far as the exhibitions are concerned, in addition to a permanent Main Hall, integrated into the landscape, there are multiple variable exhibition halls, located at different altitudes exclusively accessible through teleportation and intended for anyone wishing to visit the place.

We also have three workshops (Construction, Optimization and Animation, and Scripting), which can only be accessed through teleportation, reserved solely for those participating in the workshops.

As we can see, this platform allows for the development of a ground-level space that avatars can cover by walking, running, or flying. It also enables the construction of elevated spaces, referred to as skyboxes,

which can be accessed either through teleportation points available on the ground or private landmarks.
This functionality significantly improves the flexibility of this platform, as it not only allows the unrestricted exploration of a publicly accessible 3D space but also facilitates the provision of additional elevated areas, skyboxes , allowing for the creation of areas accessible to the general public, as well as specific rooms designated for groups or private events.
The activity "Education and Co-creation in the Metaverse in a blended approach" successfully attained a number of essential objectives that contributed to the participants' academic and personal development and to their adaption to the dynamics of modern digital society. The different workshops played a crucial role in enabling participants to confront the emerging challenges posed by the age of digital transition, equipping them with creative, technological, conceptual and collaborative skills that are considered fundamental for their effective integration into complex virtual environments.
Moreover, the programme promoted resilience within the academic community, empowering it to adapt to different working environments, especially in unexpected situations like the crisis generated by the Covid-19 pandemic. This adaptation process was facilitated by the implementation of active teaching and learning methodologies, centred on the participants, and involving co-creative projects, workshops and seminars conducted both in-person and remotely.
We promoted the mobilization of skills in new contexts, actively encouraging participants to apply the knowledge acquired in practical and diverse situations. Through seminars and exhibitions, we have forged connections between the local academic community and different global communities. We established relationships between virtual and tangible environments, and fostered social relationships both from a distance and in close proximity, thereby enriching the academic experience for students and teachers alike.
However, we acknowledge the limitations of this platform. The use of virtual reality head-mounted devices is not yet supported, and specific applications are required to access the space. The initial use of the platform can pose a challenge for some users. Therefore, in the future, we would like to explore a broader range of available platforms to diversify our training.
In summary, the IPVerso emerges as a space of vast possibilities and functionalities, aiming to provide a rich and diverse experience within the Metaverse. Through an accessible and interactive approach, this platform represents a significant contribution to addressing the challenge of training professional skills tailored to emerging markets in the Metaverse, empowering students for new professional opportunities in the ever-expanding virtual age.

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Workshops

Co-creation Workshop for Virtual Environments

Catarina Carneiro de Sousa, IPV, CI&DEI, ESEV

Fig. 2. . IPVerso session 1st edition

Fig. 1. In-person session 1st edition

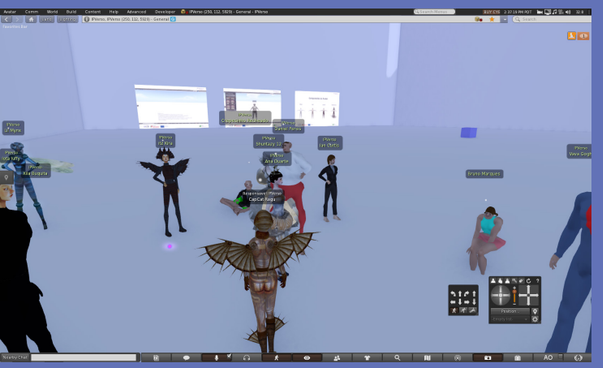

Fig. 4. IPVerso session 2nd edition

Fig. 3. In-person session 2nd edition

The Co-creation Workshop for Virtual Environments had two editions. The first was held before the official opening of the IPVerso simulator, and implemented in collaboration with the Artistic Observation and Intervention Methodology (MOIA) course.
It involved a limited group of students from the Master's Degree programme in Teaching of Visual and Technological Education in Basic Schooling (MEEVTEB), since, at that point, the simulator was not yet fully operational to allow the workshop to be opened to the entire community.
The second edition was promoted to the entire community of the Polytechnic Institute of Viseu (IPV), and included students from different years of the Art and Multimedia (APM) Bachelor's degree programme at the Polytechnic Institute of Viseu - School of Education (ESEV), and faculty members from the ESEV and the Escola Superior de Tecnologia e Gestão de Viseu (ESTGV). The primary objective of both editions was to enable participants to develop artistic content within the Metaverse and contribute to the construction of the IPVerso simulator.
This workshop favoured active methodologies, centred on the students involvement and encouraged self-learning. It focused on project-based co-creative learning strategies, using network technologies (OpenSimulator platform) to improve collaborative work, combining remote and in-person teaching. An inclusive, personalised learning and teaching approach was developed, tailored to accommodate the unique characteristics of each student.
It led to the creation of the architecture of the IPVerso virtual environment and the development of diverse artistic installations within a virtual environment, combining art, research and education. This project involved both the acquisition of new skills and the mobilisation of skills developed in new contexts. It empowered these students to face the new challenges posed by the digital transition, by enabling the development of creative, technological, conceptual and collaborative skills within virtual environments. These trainees helped create the IPVerso and their contribution to the overall project was fundamental.
These teachers, prospective teachers and upcoming multimedia artists had the opportunity to experience a platform that encompasses both art and technology. This will provide them with additional tools for the teaching and learning of art and technology at a distance, contributing to their resilience and capacity to adapt to different work environments, especially in unexpected situations, such as those generated by the Covid 19 pandemic.
The artistic works developed, along with their theoretical presentations, prove that these trainees have developed competencies across several creative dimensions: designing and creating content and artefacts; in technical dimensions: demonstrating their ability to solve technical problems stemming from the execution of their works; and in conceptual dimensions: demonstrating the ability to engage in cooperative work with their peers, negotiate the process and realisation, investigate and describe the themes to be addressed.
The workshops actively promoted equality of opportunities and gender representation in art, culture and technology, as most of the participants in the working group were female.

Co-creation Workshop and Optimization of 3D Models

Nelson A. F. Gonçalves, IPV, ESEV

This workshop had a total duration of four hours and was organized into two sessions delivered in a hybrid format, after working hours. The first in-person session took place on March 21st at the Digital Art Laboratory of the Polytechnic Institute of Viseu - School of Education (ESEV). The second session, held remotely, occurred on March 28th via video conferencing and on OpenSimulator's Craft World grid, on the IPVerso simulator.
The aim was to integrate the dynamics offered by both remote and in-person teaching, combining the creation of spaces for group reflection and guided exploration during the in-person sessions with a more independent type of experimentation and exploration during the remote sessions.
The main intention was to encourage the creation of strategies that would empower the trainees with greater autonomy and responsibility for their learning. Finally, specific support materials were created and made accessible on the Moodle platform.
The primary objective of the activity was to support the development of technical skills in the field of 3D modeling, which are crucial for creating artistic works within the Metaverse. Simultaneously, the intention was to pique the participants' curiosity about the creation of 3D models for virtual environments and to introduce

Fig. 1. In-person session

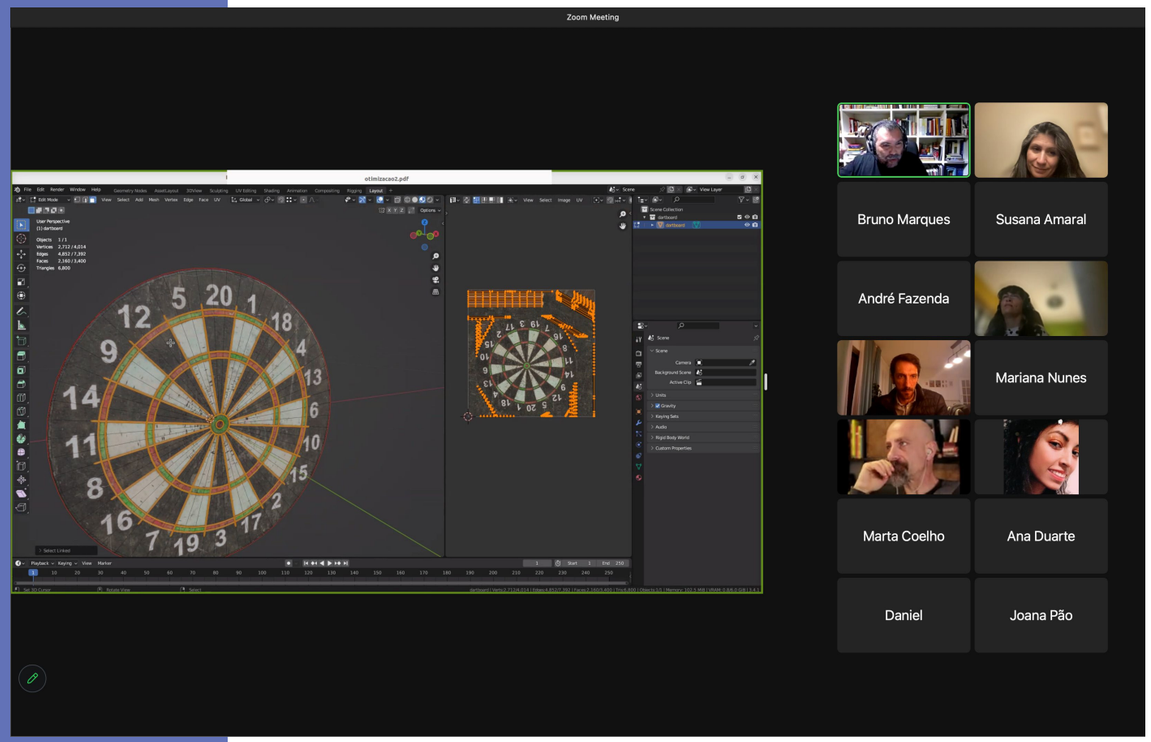

Fig. 2. video conference session

some of the techniques used in this field. The workshop was aimed primarily at the academic community of the Instituto Politécnico de Viseu but was also open to the general public. In both cases, participants were required to be familiar with Blender software and the OpenSimulator platform. The first session (see Figure 1) mainly focused on preparing and optimizing existing 3D models for uploading into OpenSimulator. After a brief introduction to some basic Blender commands, the trainees were invited to explore various tools and techniques, guided by the instructor, for cleaning up and reducing the number of vertices used (such as removing duplicates/doubles, eliminating separate meshes, decimation, among others). Next, common problems were addressed, solutions were presented, and additional recommendations were provided (scale and dimension manipulation, Normals, Shade Smooth and Flat, Autosmooth, Level of Detail, textures, etc.). Finally, once the 3D model was optimized and exported, the trainees used the OpenSimulator upload tool on the the Firestorm browser to upload their models to the IPVerso simulator.

The second session was organized for two main purposes: a) to provide support for autonomous learning activities, addressing doubts and finding solutions to any problems that may have occurred during exploration and experimentation between sessions; b) to explore the workflow involved in creating LowPoly versions of 3D models, including the texture baking process. This session began via video conference, using the Zoom platform (see Figure 2), and continued in the IPVerso simulator, where the trainees were encouraged to freely explore all the solutions presented and/or share their successes and questions raised during autonomous exploration (see Figure 3).

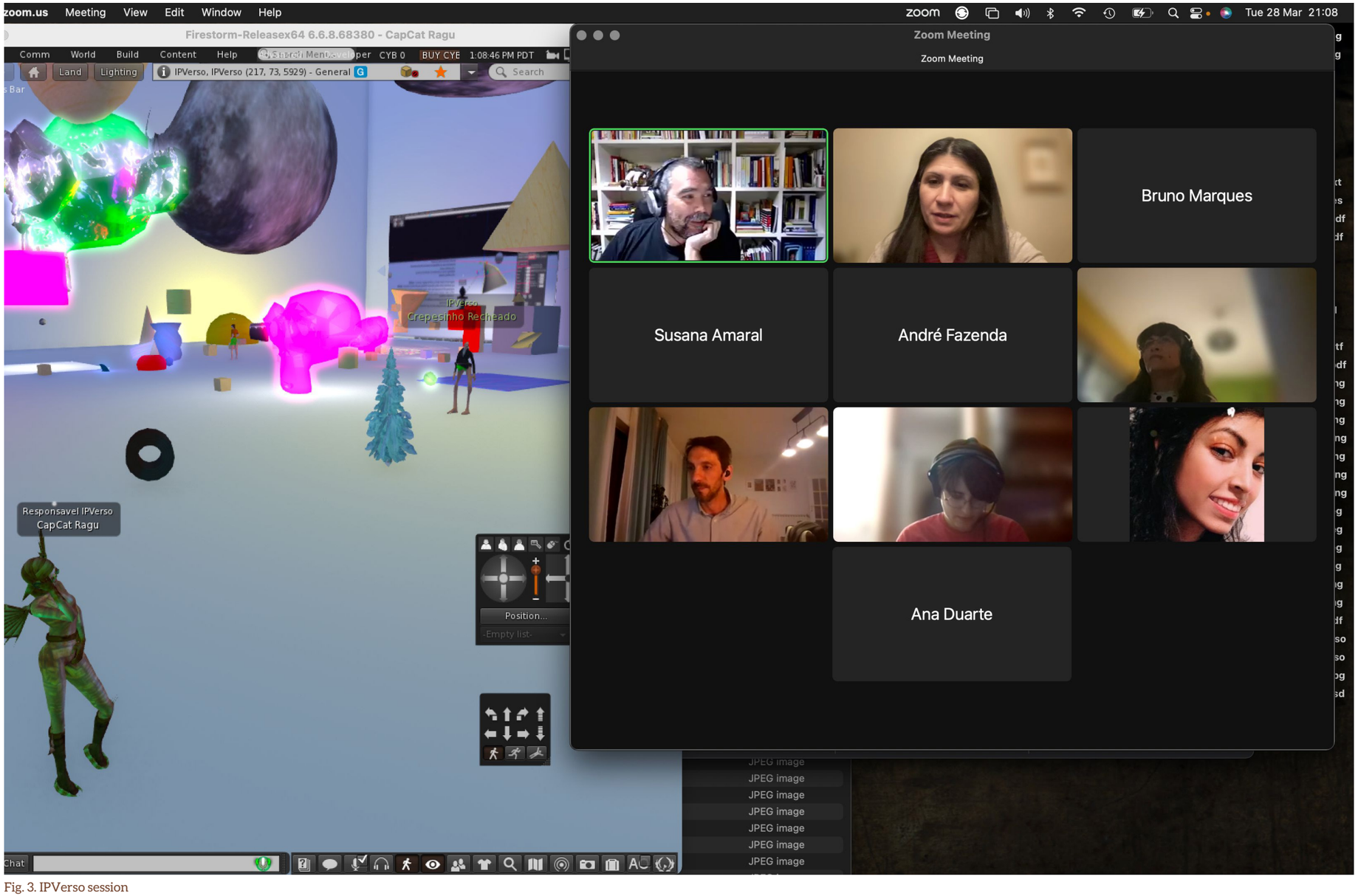

Fig. 3. IPVerso session

Co-creation Workshop of Scripts for Virtual Environments

Pedro Neves Rito, IPV, CI&DEI, ESEV

Fig. 1. In-person session

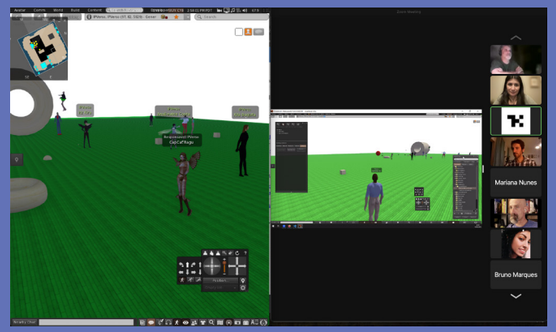

Fig.2. Video conferencing and IPVerso session

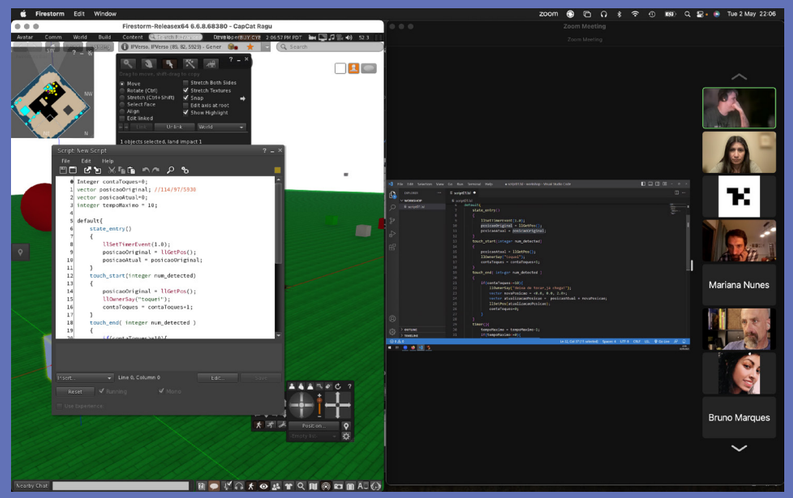

Fig.3. Video conferencing and IPVerso session

The primary objective of this workshop was to encourage people to learn the syntax of a scripting language to be applied in virtual environments. It also sought to foster autonomy among the participants by introducing key concepts of this language, enabling them to search for and adapt existing scripts to suit their specific needs. While the workshop was primarily aimed at the academic community of the Polytechnic Institute of Viseu (IPV), it was also opened to the general public.

The workshop was conducted in a hybrid format and spanned a total of four hours, divided into two sessions of two hours each, held after regular working hours. The first session was held in person and took place on April 18th at the Digital Art Laboratory of the Polytechnic Institute of Viseu - School of Education (ESEV), while the second session was conducted remotely and took place on May 5th, via video conferencing and on the OpenSimulator platform, located within the Craft World grid, and on the IPVerso simulator. Both in-person and remote learning dynamics were developed, always encouraging participant autonomy. Support materials were created and made available on the Moodle platform.

The initial in-person session (see Figure 1) primarily focused on introducing the scripting environment, and outlining its potential and limitations. A free space was created for these sessions within the IPVerso simulator. Within this space, participants were given the chance to create visual objects and apply the scripts they were developing. This introductory session also addressed topics related to syntax, algorithm analysis, script construction, validation and application.

In the second session, held online (see Figure 2 and Figure 3), some additional concepts were introduced and participants were given the opportunity to use and adapt more elaborate scripts. Their participation involved reading, analysing and customising these scripts. This session also highlighted the functions specific to this virtual environment, including control, repetition and organisational structures. While the simulator includes a text editor that allows the script to be validated before application, its graphical interface lacks the required features. Therefore, an external text editor with a more pleasant and adaptable graphic environment was employed.

This editor can also be configured for script validation, but this configuration process would require additional effort from participants. Hence, it was decided that time should be used in other activities related to deepening knowledge. Some repositories and other online sources were used to parameterise more elaborate events/animations, providing readily available scripts for immediate application.

Time and space for learning a programming or scripting language are always limited, as they depend on the initial objectives of each participant. To the extent possible, the initial goals that were proposed were achieved, and some of the participants expressed interest in furthering their knowledge of script writing for application in the IPVerso simulator.

Co-creation Workshop of Soundscapes for Virtual Environments

Luís Eustáquio, Instituto Politécnico do Cávado e do Ave

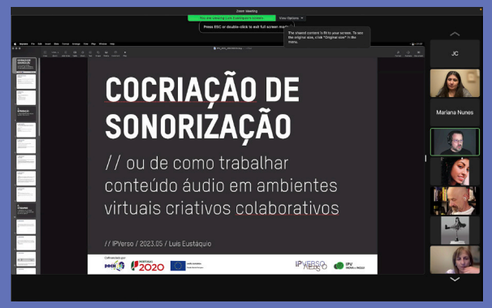

Fig. 1. Remote session, theoretical exposition.

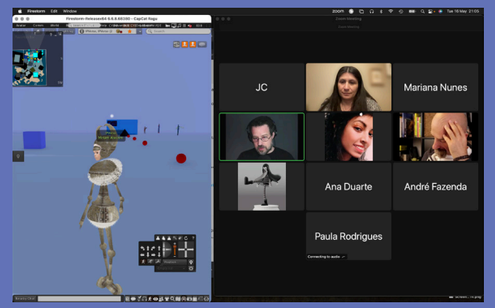

Fig. 2. Remote session, practical exposition.

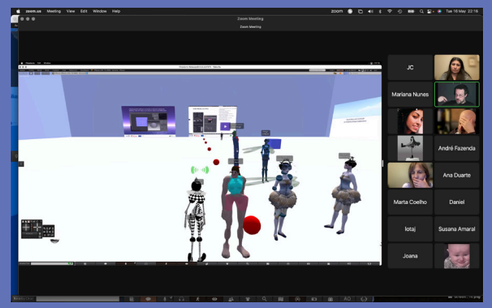

Fig. 3. Remote session, Collaborative exploration.

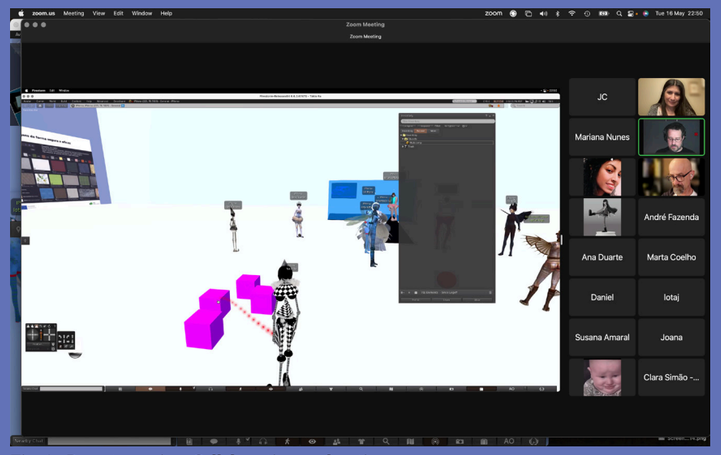

Fig. 4. . Remote session, Collaborative exploration.

The Workshop on Co-creation of Soundscapes for Virtual Environments took place in a single session, held remotely, within the IPVerso and with the support of the ZOOM platform of the Polytechnic Institute of Viseu (IPV). It occured on May 16th, 2023, after working hours, spanning a total duration of two hours. This workshop was open to the entire IPV community, within the scope of the supporting projects developed under the "Inova e Inclui" project.

The central aim of the workshop was to provide participants with knowledge about instruments, techniques, and material resources for the design of soundscapes to be used in virtual environments, particularly within a context of co-creation in collaborative settings. As the session was held exclusively online, using digital platforms, we employed the tools deemed suitable for the planned activities and that were capable of serving the selected methodologies. The session was divided into two moments: in the first moment, an exploratory session featuring a practical framework and resource presentation was carried out via the IPV's ZOOM platform, using support slides available on MOODLE.

The second moment followed a demonstrative approach involving practical exploration conducted within a collaborative virtual environment, using the IPVerso, in Craft World. Active methodologies, using demonstration and task execution, were employed. These methodologies were complemented with insights provided through the text and audio chat features of the platforms used. Participants used these resources for additional information and clarification of doubts.

The first and expository moment was used to provide resources, introduce tools related to audio production in a digital environment, clarify specific aspects of audio production particularly relevant to virtual environments, outline possible ways to import audio content into a virtual environment, and discuss the collaborative application of this creative content.

The practical exploration enabled participants to apply and validate the resources and techniques from the initial presentation. They used the files and materials provided to them via the platform, which enabled them to promptly execute the tasks they were proposed. Real-time discussion, and the changes made by the participants in the virtual environment, confirmed that they had successfully completed the tasks and applied the newly acquired knowledge.

The outcomes clearly show that participants, overall, acquired a set of new creative skills during the workshop, and achieved a deeper understanding of how to develop immersive sound components in collaborative virtual environments. This knowledge represents a meaningful way to complement the existing visual, spatial, and temporal components of the creative process in these environments. The skills acquired by working the aural plane of digital immersive experiences, enable a wider range of experimentation, while fostering collaborative creation in virtual environments. Additionally, this paves the way for multiple research opportunities in the field. The results observed suggest that a continued contribution of these skills adds value to the future of practice, teaching, and research in this domain.

Co-creation Workshop on Animation for Virtual Environments

Nelson A. F. Gonçalves, IPV, ESEV

Fig.1. In-person session

The primary aim of this workshop was to foster the development of technical skills in the field of 3D animation, which are crucial for supporting the creation of artistic work within the Metaverse. Simultaneously, it aimed to spark curiosity in the domain of animation creation for virtual environments and introduce some of the techniques used in this field. The workshop was primarily targeted at the academic community of the Instituto Politécnico de Viseu but also welcomed the general public, assuming some familiarity with Blender software and the OpenSimulator platform.
The activity was organized in a hybrid format with a total duration of four hours, divided into two two-hour sessions, and took place after working hours. The first session was conducted in person on June 6th at the Digital Art Laboratory of the Polytechnic Institute of Viseu - School of Education (ESEV). The second session, conducted remotely, took place on June 13th via videoconference and on OpenSimulator's Craft World grid, on the IPVerso simulator. One of the aims was to reconcile the dynamics provided by both remote and in-person teaching approaches, combining the creation of moments for group reflection and guided exploration during the in-person sessions, while fostering more independent experimentation and exploration during remote moments. The primary intention was to encourage the development of strategies that could empower the trainees with greater autonomy and responsibility

Fig. 2. In-person session

for their learning. Finally, support materials were created and made accessible on the Moodle platform.
The first session focused mainly on uploading avatar animations into OpenSimulator using the Collada (.dae) version of the 3D human male model provided by Project Bento[1]. The trainees explored the import and configuration of the model in Blender (see Figure 1) and subsequently created keyframe animations by manipulating the provided armature (see Figure 2). Once the animation was exported, the trainees used the OpenSimulator upload tool accessed via the Firestorm browser to upload and configure the playback mode of the animations in the IPVerso simulator. The usefulness of adapting this workflow for creating static poses was also demonstrated. Additionally, participants had the opportunity to delve deeper into certain concepts and techniques, notably the transfer of animations between armatures, through a technique known as retargeting, which allows for the reuse of animations.
The second session was organized with two purposes: a) to support autonomous learning activities, clarifying doubts and finding solutions to any problems that may arise during exploration and experimentation between sessions; b) to explore the technique known as animesh (animated mesh), which allows the use of armatures and animations on objects that are independent of the avatar. The session began via video conference, using the Zoom platform (see Figure 3), and the work continued in the IPVerso simulator, where trainees were encouraged to freely explore all the presented solutions and/or share the successes and concerns (see Figure 4) raised during autonomous exploration.

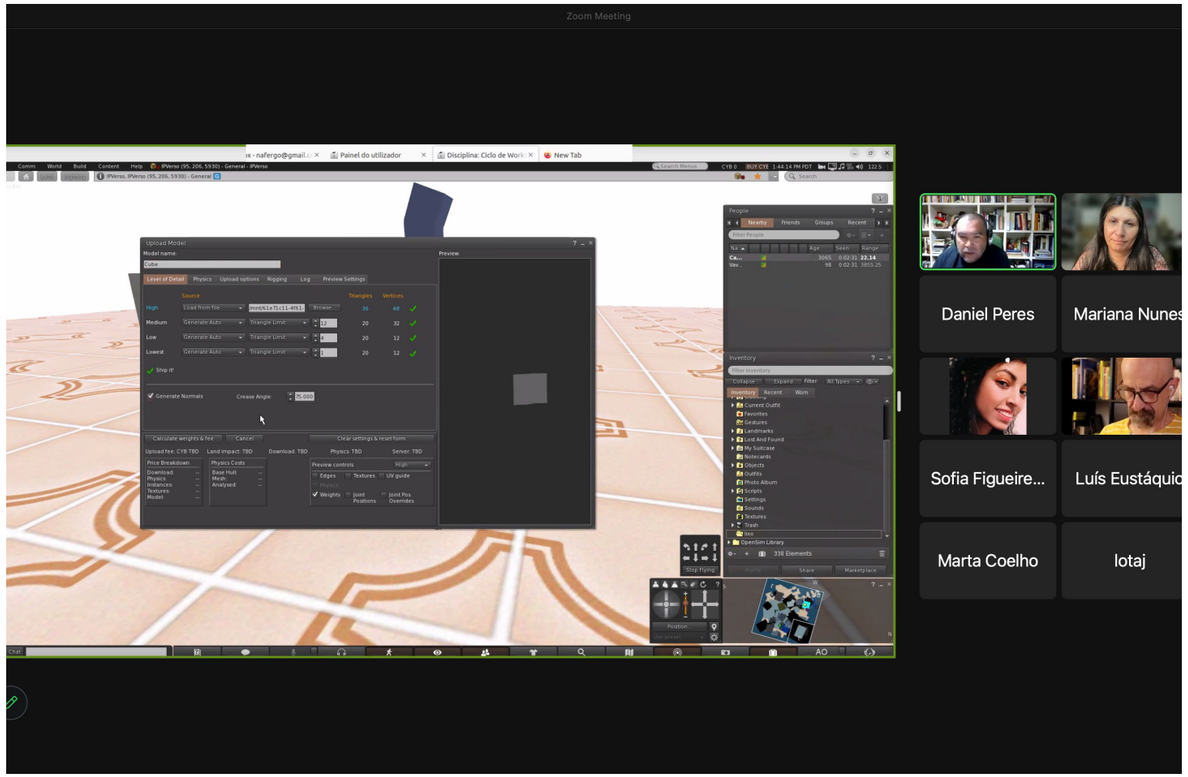

Fig. 3. Video conference and IPVerso session

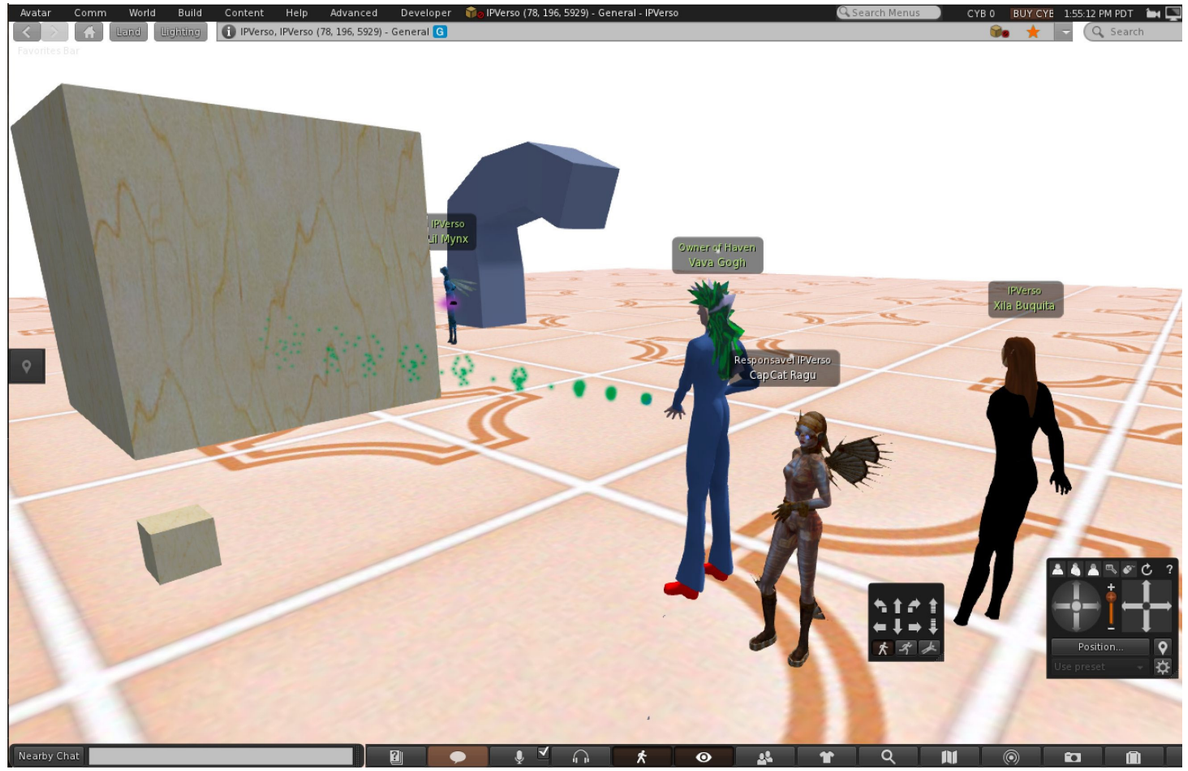

Fig. 4.IPVerso session

1 https://wiki.secondlife.com/wiki/Project_Bento_Resources_and_Information

Exhibitions

A/R/T
artists, researchers, teachers

Catarina Carneiro de Sousa, IPV, CI&DEI, ESEV

The A/R/T exhibition, which stands for Artists, Researchers, Teachers, presents the results of the first edition of the Co-creation Workshop for Virtual Environments (Sousa, 23), organised in conjunction with the “Metodologias de Observação e Intervenção Artística” (Artistic Observation and Intervention Methodology - MOIA) course of the “Mestrado em Ensino da Educação Visual e Tecnológica no Ensino Básico” (Teaching of Visual and Technological Education in Basic Schooling - MEEVTEB) at the Polytechnic Institute of Viseu - School of Education. The artists featured in this exhibition are students enrolled in this course, future teachers who have developed a co-creative process, combining practical and theoretical research.
A R T stands for A=Artist, R=Researcher and T=Teacher. It represents an art-based research practice specifically geared towards art teaching and/or educational research, incorporating elements of Arts-Based Educational Research (ABER) (Dias & Irwin, 2023). In the early 20th century, a group of lecturers at the University of British Columbia in Canada (notably Rita L. Irwin) compiled a series of dissertations created by their students that combined art-based research with education. This hybrid methodology is based on practice that incorporates knowledge, practice and creativity, along with different types of artistic forms such as literature, visual arts, or performing arts (Leavy, 2009). An a/r/tographic practice can involve any type of art-based research process, and what distinguishes it is precisely the intrinsic interdependence between the roles of teacher, researcher and artists (Irwin & Sinner, 2013). This type of practice combines different forms of research, both textual and imagistic, without favouring one over the other, and aims to generate hybrid results. According to Belidson Dias (2023), the a/r/tographer occupies the "intervals of time/space, in liminal space, third spaces, between places" (Dias, 2023, p. 21). This methodology is associated with rhizomatic practices that also favour the use of the IPVerso:

> A/r/tography is a research methodology, a creative practice, and a performative pedagogy that lives in the rhizomatic practices of the liminal in-between. These inbetween spaces of becoming prompt disruption of duelling binaries, conceptions of identities and the rush to certainty. Instead, invention becomes integral to social, cultural, economic, and political processes that are reimagined as concepts situated within events. (Irwin, 2013, pp. 199-200)

These singularities align with Gilles Deleuze and Félix Guatarri's concept of the rhizome (Deleuze & Guattari, 2008), described in the first chapter of this book. They can be events, works of art, performances or even classes. They are the nodes of the rhizome, what the authors call plateaus of intensity. Singularities where intensity reaches a certain plateau (see Chapter 1)
A/r/tography involves questioning the world through art. Artistic practice and research are intertwined, and not a mere illustration of the other; instead, they are "woven" together to create meaning. This methodology can focus more on the artist/researcher/teacher themselves, but it can also involve the social fabric. It can also be a co-creative practice when developed by a group or community of a/r/tographers (Irwin & Sinner, 2013). This is exactly how our simulator was built, as a co-creative and

a/r/tographic practice, in which the roles of artists, researchers and teachers (or trainee teachers) were closely linked.
In this exhibition, we can find the a/r/tographic practice undertaken by students from the MEEVTEB. Some of them took part in the first Co-Creation Workshop for Virtual Environments where they were all displayed in a spiral corridor. The last posters, on the inner part of the spiral, allowed a connection (teleportation) to their respective installation, also located in the IPVerso simulator, but housed in specific skyboxes[1] designed for each work.

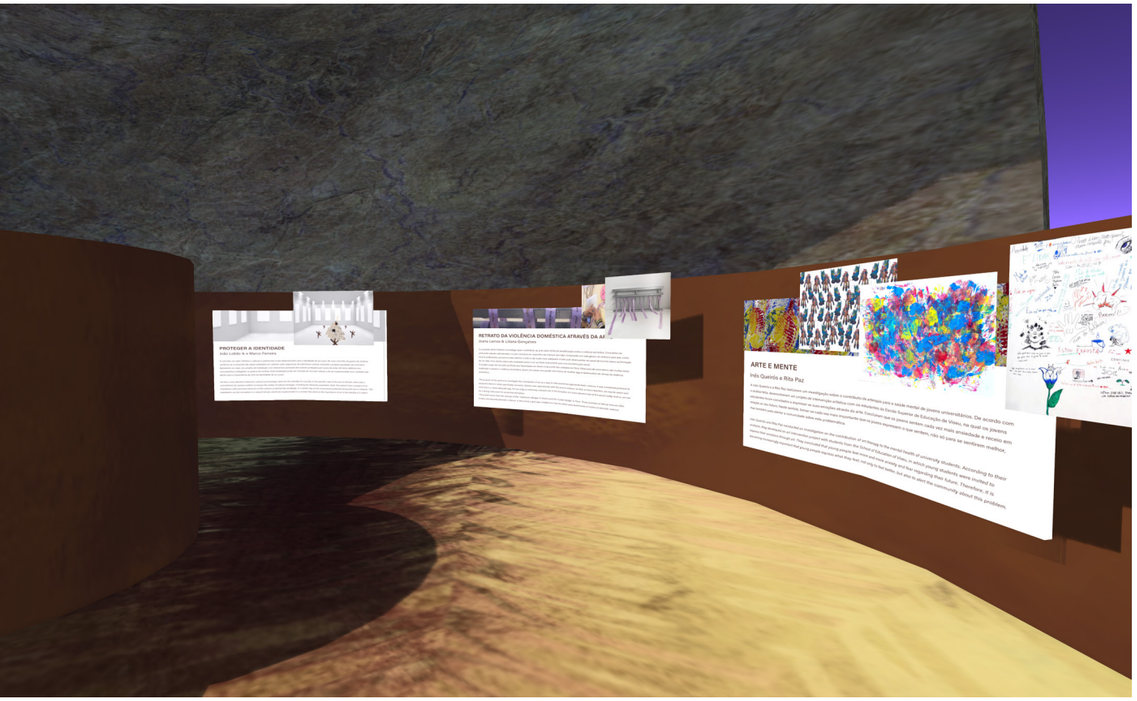

Fig.1 Images from the main room

conducted their practice directly within the Metaverse. Four artworks resulted from the co-creative processes specifically created for this medium, resulting in four artistic installations that can be visited in the IPVerso. Another part of these works was not specifically created for the Metaverse; they are a/r/tographic projects developed in MOIA as prototypes and can be implemented in the future. All these works took on the form of posters that shared the main exhibition room. There

The Architecture of the IPVerso
Mariana Sá
MEEVTEB, IPV, ESEV

As mentioned in the first chapter, Mariana Sá contributed to the construction of the IPVerso Sim, by designing the architecture of the different navigable spaces (see Chapter 1). Her exploration of the Metaverse world involved researching architectural projects

1. In platforms like OpenSimulator, a skybox is any construction with enough space to be visited by avatars, located at altitude, and invisible from the Sim's digital terrain.

Fig 2. Images from the main room

developed within these digital environments. In this project, she channelled her creativity to generate structures that mirror the harmony of natural forms and integrate with the surrounding digital terrain.
Mariana Sá found out that Architecture plays a leading role in the creation of virtual environments. A vision emerges where the virtual realm presents itself as a promising stage for future architectural endeavours. In this new context, the role of the architect transcends boundaries, allowing for broader interaction and unexplored experiences.
The limits of the Metaverse open up to a new kind of cultural dialogue, where virtual vernacular creations can combine the richness of traditions with a vision of the future. This virtual vastness, devoid of geographical constraints, brings together a diverse community of individuals from multiple cultural backgrounds. In this scenario, the Metaverse is more than a place - it's a global ecosystem, a blank canvas for the fusion of cultures and the creation of unique narratives.

Another day at work
Afonso Paiva e Isabel Lopes
MEEVTEB, IPV, ESEV

The joint proposal offered by Afonso Paiva and Isabel Lopes unfolds through creative activities that intersect visual art, theatre and performance, expanding educational horizons through art. Drawing from abstract expressionist painting currents, it explores the collaborative dynamics of performance. This project highlights the performative nature of abstract expressionism and demonstrates how performance art can interact with other forms of artistic expression. In this context, the artists created a performance that combines the creation of an abstract canvas with a critique of the growing individualisation and impersonality in the world of work.
This proposal reveals its potential application in an educational context, recognising that the teaching profession requires

diverse skills, including creativity, a crucial component in the teaching of subjects such as Visual Education and Technological Education. This project challenges teachers to incorporate human, social and ecological values into their practice, using art as a pretext (Paiva, Lopes, Souto-e-Melo, & Pereira 2023).

Art and Mind
Inês Queirós e Rita Paz
MEEVTEB, IPV, ESEV

Inês Queirós and Rita Paz's journey explores Art Therapy as a means to support mental well-being, as well as its specific contribution to the mental health of young university students. This research culminated in the conception of an artistic intervention project, carried out in collaboration with students from the Viseu's School of Education. In this project, young individuals were invited to channel their emotions through art, thus constructing a tangible expression of their inner worlds.
The results of this research reaffirm a concerning trend: young university students are increasingly struggling with feelings of anxiety and apprehension about the future. In this context, there is an emerging need to provide a platform for the genuine expression of these emotions, not only to ease emotional burden but also to raise community awareness about this issue. Through the lens of art therapy, this project sheds light on the transformative power of the arts, and their ability to give voice to young people in a world where pressure and anxieties seem to be constantly present (Queirós, Paz, Souto-e-Melo, & Rodrigues, 2023).

Railings: A portray of domestic violence through art
Joana Lemos e Liliana Gonçalves
MEEVTEB, IPV, ESEV

The essence of this proposal lies in exploring the role of art as a means of raising awareness about the complex issue of domestic violence. By focussing on children who directly face this type of adversity, this study aims to foster future educators' attentive understanding and a more informed capacity for intervention. Its importance is underscored by the urgent need for a public and active response to this issue that goes beyond the political spheres and embraces the artistic realm. This medium provides a unique opportunity to shed a sensitive light on a social reality that is all too often covered up.
The inspiration for this project comes from the iconic "Ponte dos Namorados" (Valentine's Bridge) in Aveiro and the famous "Pont des Arts" in Paris. These symbols of eternal promises of love, often broken and darkly transformed into domestic abuse, inspired the conception of a railing that becomes a canvas for the silenced voices of domestic violence victims, where intertwined ribbons carry testimonies that echo in the shadows. Each ribbon, containing written fragments about domestic violence, represents the courage to confront a painful reality. While they are not real testimonies, these ribbons symbolise a quest for justice, empathy and understanding. This project invites us to reflect on the transformative power of art and its ability to give voice to those whose stories often remain lost in silence (Lemos, Gonçalves, Souto-e-Melo, & Pereira, 2023).

Protecting Identity
João Lobão e Marco Ferreira
MEEVTEB, IPV, ESEV

Art transcends temporal boundaries and is deeply rooted in the historical, cultural and heritage identity of a people. In the specific context of the war in Ukraine, we have witnessed the determined efforts by multiple entities struggling to safeguard the cultural legacy, including that of the resilient Ukrainian population. It is in this context that this installation project emerges, bringing to life personal elements of the authors, sheltered by sandbags in a symbolic evocation of the monuments protected during the Ukrainian conflict.
In this proposal, presented as a digital prototype, each element is protected, and each personal trace encapsulates memories and narratives that deserve to be safeguarded. Just like cultural monuments, these pieces become traces of identity, enduring the storm of adversity.
This project reminds us that, even in times of conflict, art remains a beacon of hope and a testament to human resilience, paying tribute to this transcendent power and, at the same time, calling for the perennial appreciation of art in the construction of collective identity.

Sorority
Joana Monteiro e Inês Soares
MEEVTEB, IPV, ESEV

The underlying purpose of this work is to explore the potential of virtual environments as a platform for creating educational artistic activities. Specifically, it investigates the feasibility of using a virtual installation as a tool for protest and outcry.
In this proposal, emphasis is placed on the representation of sorority and unity among women, highlighting their collective strength in the feminist struggle. Female bodies and intertwined tresses emerge as symbols of this unity and vehicles for protest. Each element gives voice to the idea that cohesive strength is fundamental to the unity of the feminist movement.
The relevance of this study lies in the fundamental notion that unity is a necessary

Fig 3. Sorority, Images by Joana and Inês

constant. This unity, as witnessed in the previous waves of the feminist movement, becomes vital to ensuring the ongoing progression of women's rights, preventing stagnation or regression.
In this virtual installation, we are invited to explore the evocative power of art in creating a space for the expression of social aspirations and demands (Monteiro, Soares, & Rodrigues, 2023).

In the context of the visual arts, colour plays a central role. Artists channel emotions, concepts and messages through their colour palette. However, for colour-blind individuals, the visual experience of a work of art takes on completely different contours. This discrepancy led to the creation of this virtual installation.
This search for answers led Abel Saraiva and Ana Alves to investigate the ColorADD

Fig. 4 e 5 Sorority, Images by Joana and Inês

ColorADD Museum
Abel Saraiva e Ana Alves
MEEVTEB, IPV, ESEV

This project was conceived with the aim of expanding the artistic experience of colour-blind individuals in virtual environments, providing them with a more meaningful immersion.

language and its applicability. Based on this research, a virtual museum was built, a space where artworks were transformed by the integration of the ColorADD symbols into their corresponding colours. This innovative environment paves the way for art to be experienced by colour-blind individuals in a more meaningful way.
The aim of this work is to make a

contribution to the inclusion of colour-blind people in virtual spaces. The artists invite us to reflect on the potential of technology as a vehicle for inclusion and understanding, opening up a new horizon for the appreciation of art, regardless of the colours we can perceive (Saraiva, Alves, Souto-e-Melo, & Rodrigues, 2023).

virtual installation guided by the intention of questioning how collaborative virtual environments can stimulate our senses.
At the heart of this exploration, a virtual island was conceived as a stage for auditory and visual sensory experiences related to nature, designed as a mosaic of distinct places and sensations. Each of these places incorporates not only visual elements but also sounds, adding authenticity to the experience. On the beach, the movement of

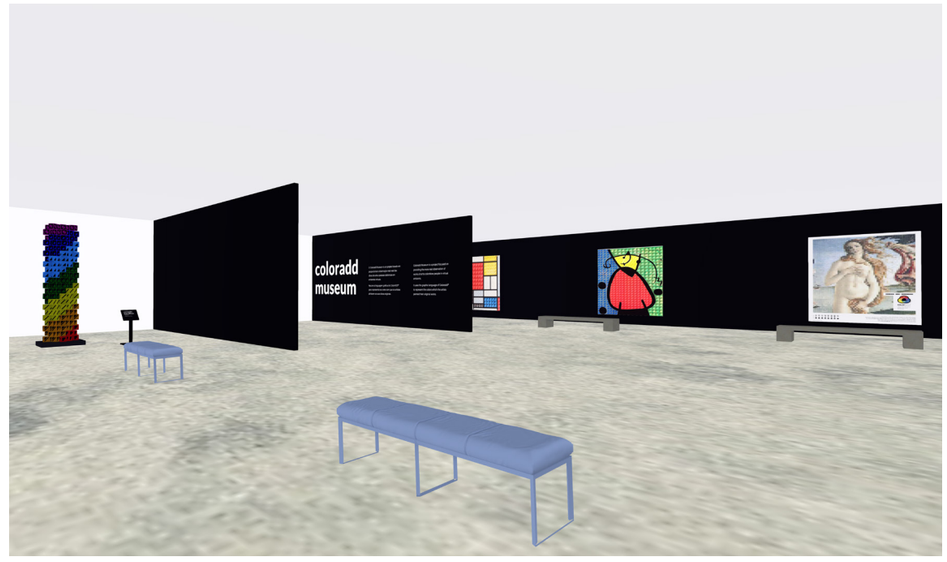

Fig. 6 ColorADD Museum Images by Abel and Ana

Five senses
Clotilde Silva e Kateryna Holovko
MEEVTEB, IPV, ESEV

The boundaries between the real and the virtual worlds come to life in this project, where the exploration of the sensory potential of the Metaverse, with a special focus on sight and hearing, intersects with immersive experience. Inspired by Jean Baudrillard's concept of simulacra, Clotilde Silva and Kateryna Holovko have created a

the water is accompanied by the sound of the waves, while palm trees sway in the sea breeze. In the countryside, birdsongs fill the air, in the forest we can hear animals, and the darkest area is shrouded in dark clouds and rain, echoing with the roar of thunder.
As we explore this installation, we are prompted to reconsider our relationship with the sensory stimuli that surround us. Crossing this island encourages reflection on the immersive possibilities offered by the virtual environment (Silva, Holovko, Pereira, & Figueiredo, 2023).

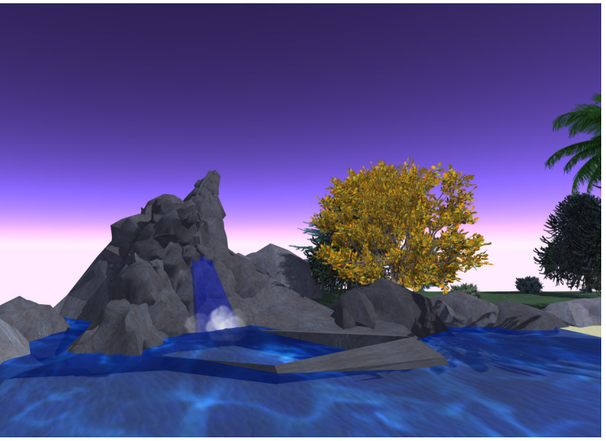

Fig. 7, 8 e 9 Five Sences Images

Authentic praise
Sara Ferreira e Teresa D'Aragão Santos
MEEVTEB, IPV, ESEV

This project emerges from the problematisation of concepts such as plagiarism, appropriation, copying and authorship, through the lens of the Metaverse. Sara Ferreira and Teresa D'Aragão Santos seek not only to unravel the historical journey of these concepts but also to rethink their definitions in the contemporary context.
Drawing on Walter Benjamin's conceptions and Pierre Huyghe's piece "The Third Memory", this project explores the possibilities of appropriating artworks developed by other artists from the A/R/T exhibition. The process involved recorded interviews with the different working groups, as well as photographic records of their creations. This data was analysed and manipulated by the artists to become part of a virtual installation where reflection and irony intersect.
In a time marked by the exponential development of digital technologies, such as artificial intelligence, in the production, dissemination and perception of information, including in the artistic and cultural fields, the use of digital platforms emerges as a pertinent choice to explore the evolution of the boundaries of authorship and creation in the digital age (Ferreira, Santos, Figueiredo, & Rodrigues, 2023).

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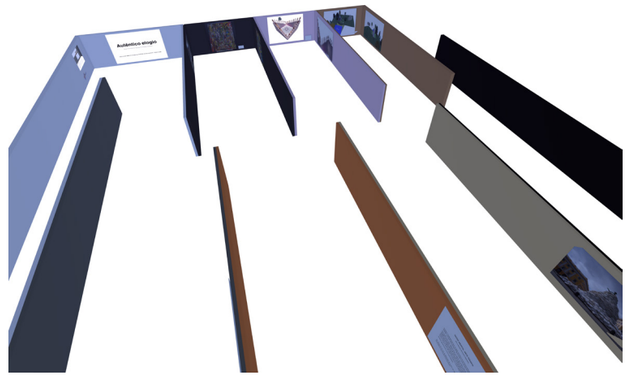

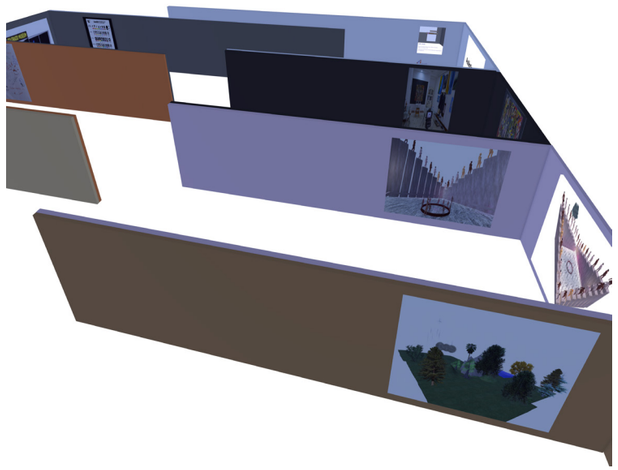

Fig. 10 e 11 Authentic praise Images

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MILHO

Exhibition of illustrations of legends and tales of yesteryear

Catarina Carneiro de Sousa, IPV, CI&DEI, ESEV
Lília Basílio, Câmara Municipal de Viseu

In 2021, the Museu de História da Cidade de Viseu (Museum of the History of the City of Viseu-MHC) collaborated with students from the Art and Multimedia (APM) Bachelor's programme taught at the Polytechnic Institute of Viseu - School of Education Viseu (ESEV) to guide them around the city and encourage them to narrate local legends and folk tales

The students, as part of the Drawing III course, were then tasked with developing a series of illustrations based on these tours and the legends associated with the city that they had the opportunity to collect. The 2022 the Mostra de Ilustrações de Lendas e Histórias de Outrora (Exhibition of Illustrations of Legends and Tales of Yesteryear - MILHO) served to present these illustrations to the public, along with the entire creative process developed by the students to research, imagine and depict characters, settings and episodes from these local legends and folk tales.

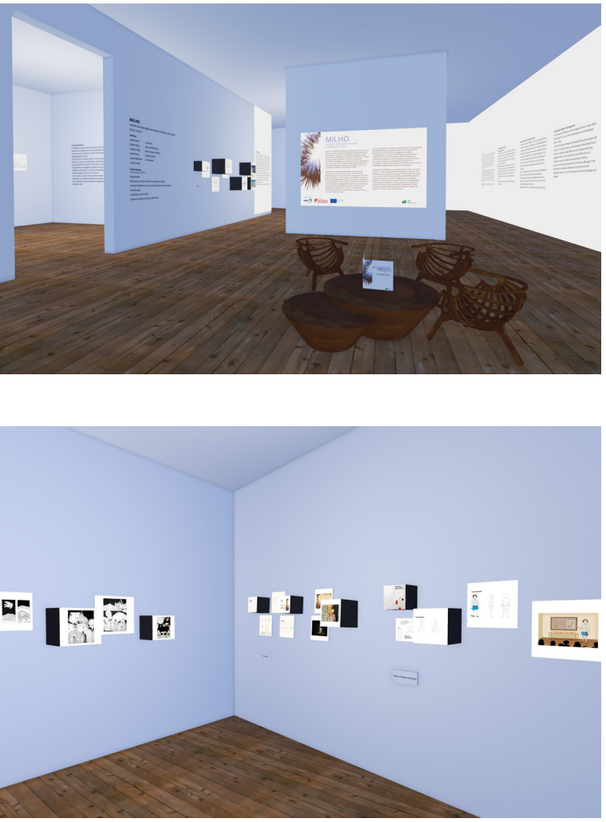
Drawing III is a second-year course in which APM students are expected to consolidate and develop the drawing skills acquired in previous semesters, applying those artistic competencies to the field of visual communication and developing new skills in the field of illustration. To fully achieve those goals, a project-based learning approach is required. This learning method must be driven by an authentic project, involve the development of each student's autonomy, and the active exploration of the problem by gathering the resources needed to implement the project (Warr & West, 2020). The collaboration with the MHC provided students with the opportunity to implement their projects in a real-world context, developing a perception of their training needs for their future professional life. It also strengthened the connection between the two institutions (ESEV and MHC), engaged students in the cultural production of the city of Viseu, and fostered their knowledge of its local historical heritage.

The exhibition delved into the archaeological site of Cava de Viriato and explored the legends of João Torto, Gaia and of the Castanheiro do Amores (Chestnut tree of love). The different approaches used by the students demonstrate how much the world of illustration can encompass. We now have new images and visual narratives to help us explore the heritage and history of Viseu.

To design the exhibition, we used the IPVerso virtual environment, where we reproduced the Museum's space to simulate the exhibition. This co-creation and rehearsal space was opened to the public in 2023 as part of the "Education and Co-creation in the Metaverse" activity, using a mixed approach, as advocated by the Inova e Inclui Project. This was not merely about digitising the tangible exhibition, but rather revealing a previous working process that allowed the organisation of collaborative work within the virtual environment.

The IPVerso simulator was used to plan the tangible exhibition and to envision how it would be arranged in the museum. For this purpose, the rooms that would be used and the supports on which the works would be displayed were replicated. Everything was to scale to provide a clear understanding of the space each work would occupy. At the time, the IPVerso was still under construction and was not open to the public. Studies were conducted regarding the setup and images were shared on a regular basis for comments and remarks regarding the specific conditions of each space: areas that couldn't

be used, lighting points, and so on. The two organisers worked together on the design the exhibition, albeit from a distance.
Later on, prints were used to guide the participants in the setup of the exhibition.
In the physical space, other changes had to be made for practical reasons. That way, what can be seen in the IPVerso does not exactly mirror what is featured in the MHC but rather what was initially designed.
The only change introduced was the scale. Initially, to get a sense of the line of sight and perspective, everything was created to the scale of the avatar, as if it were a person in the tangible world. In other words, the proportion of the spaces in relation to the avatar was equivalent to that of a real person.
In order to open the virtual exhibition to the public, it was necessary to change this scale. All the architecture and objects on display are in proportion to each other but were significantly enlarged in relation to the avatar. This adjustment was necessary because in this type of virtual environment users commonly have a third-person view - a perspective from behind and slightly above the user's avatar. If the realistic scale were



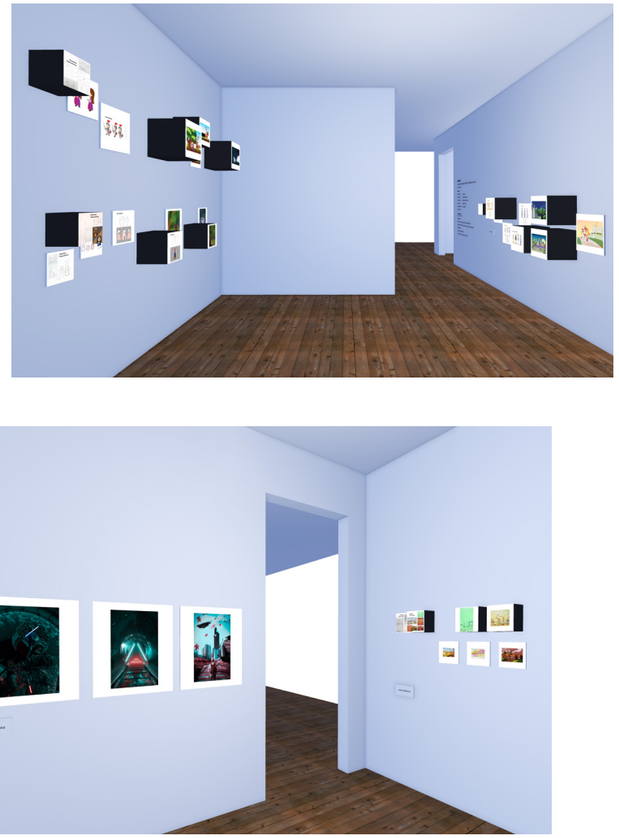


Fig. 1, 2, 3 e 4. Images of the virtual exhibition

maintained, users would always have the camera associated with the avatar, often positioned outside the rooms, making it very difficult for them to visit the exhibition and navigate the space.
The decision to open the IPVerso exhibition to the public in its project format was made to demonstrate the capacity of OpenSimulator-based platforms to develop project simulations to be implemented in the tangible world. The advantage of this environment lies in its capacity to create three-dimensional objects and spaces collaboratively and remotely.

Fig. 5. Ilustration by Joana Medeiros, Artes Plásticas e Multimédia, ESEV, IPV

The Cava de Viriato

The Cava de Viriato is 32-hectare fortification, composed of eight sections of earthen rampart, accompanied by an outer ditch. It is one of Viseu's most enigmatic archaeological sites.
In the 17th century, literature associated this construction with Viriato. In the 20th century, archaeologists interpreted it as a campsite possibly built by Romans or Muslims. More recently, researchers have suggested that the walls could have been built in the 10th century to protect a new city ordered by D. Ramiro.
Over time, it became absorbed by the city while retaining its mysterious, almost rural yet imposing character, remaining a prominent site in the local heritage and imagery.
Joana Medeiros chose to represent the Cava as it was in other times, as a rural environment, using both traditional and digital media. André Alves chose to imagine how the Cava might have looked if the city of Viseu had actually been built within its walls by D. Ramiro, using only graphite on paper. Rafael Ferreira opted for a futuristic vision of the Cava, in a science fiction setting, using digital photomontage.

Fig. 6 e 7. Ilustrations by Joana Medeiros, Artes Plásticas e Multimédia, ESEV, IPV

Fig. 8, 9 e 10. Ilustrations by André Alves, Artes Plásticas e Multimédia, ESEV, IPV

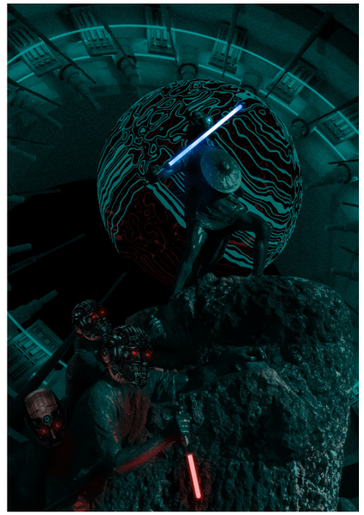


Fig. 11, 12 e 13. Ilustrations by Rafael Ferreira, Artes Plásticas e Multimédia, ESEV, IPV

João Torto
In June 1540, João de Almeida Torto announced that he would fly from the tower of the Cathedral to the Campo de São Mateus.
On the eve of the event, João de Almeida unveiled his flying device: double wings

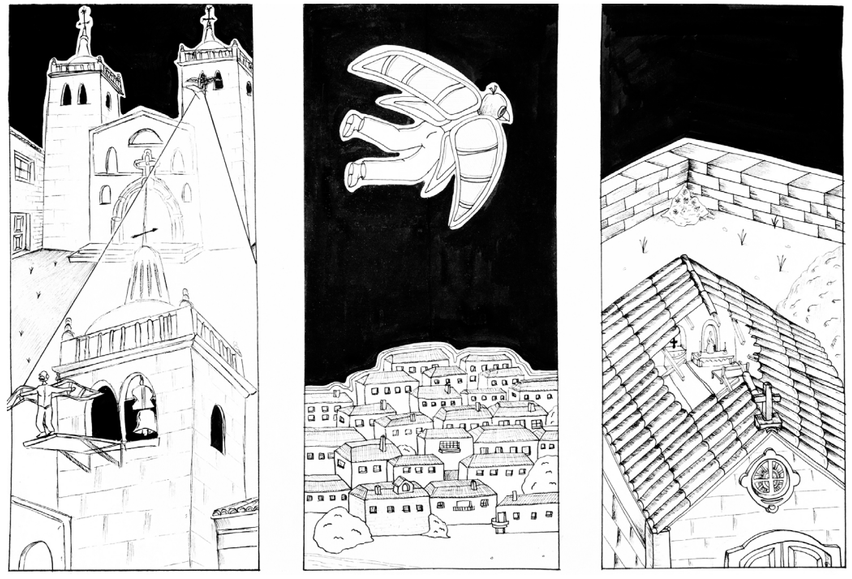


Fig. 14. Ilustrations by Joana Santos, Artes Plásticas e Multimédia, ESEV, IPV

made of strong fabric, connected by iron hinges and a leather belt with padded rings to secure his arms; triple-soled shoes to cushion his fall; and a hood in the shape of a bird's head.
On the designated day and at the appointed time, the Campo de São Mateus and the Cathedral Churchyard filled with people. João climbed the Cathedral tower, hoisted his wings and jumped. He started well, but one of his wings malfunctioned, his hood fell over his eyes, and he crashed unconscious onto the chapel of São Luís (Castilho, 2011).
Joana Santos opted for a representation entirely based on traditional drawing and illustration techniques. Beatriz Brás, Maria Helena Viveiros and Rui Almeida, on the other hand, produced their final illustrations entirely digitally, even though their exploratory sketches were done using traditional techniques. In the case of Lara Pires, there's a combination of different approaches: the various layers of the final illustrations were created using watercolour on paper that were afterwards scanned and combined using digital image editing processes.

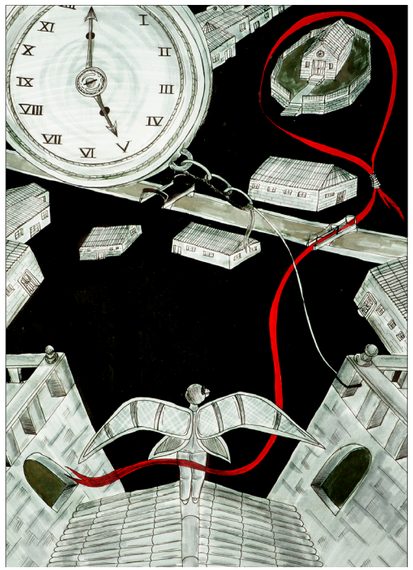
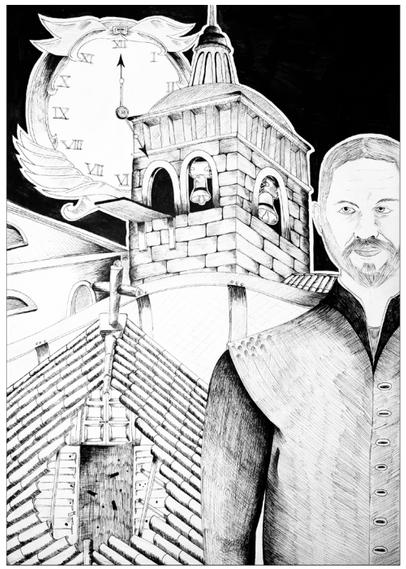
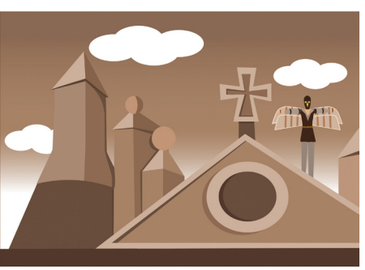



Fig. 15 e 16. Ilustrations by Joana Santos, Artes Plásticas e Multimédia, ESEV, IPV



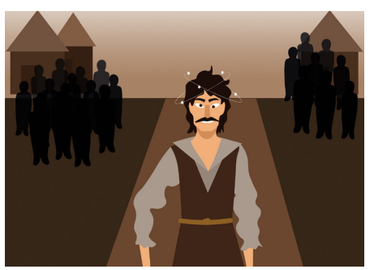


Fig. 17, 18 e 19. Ilustrations by Beatriz Brás, Artes Plásticas e Multimédia, ESEV, IPV



Fig. 23, 24 e 25 Ilustrations by Rui Almeida, Artes Plásticas e Multimédia, ESEV, IPV

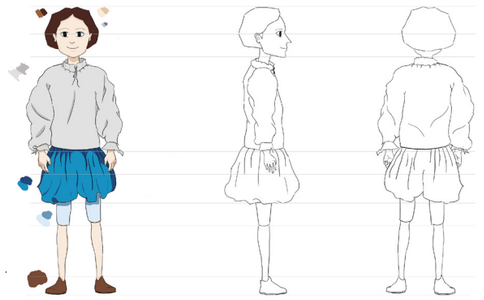
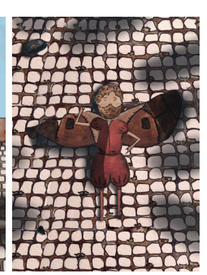
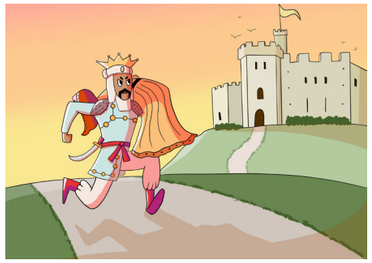


Fig. 20, 21 e 22 Ilustrations by Maria Helena Viveiros, Artes Plásticas e Multimédia, ESEV, IPV

Fig. 26, 27 e 28. Ilustrations by Lara Pires Artes Plásticas e Multimédia, ESEV, IPV

The legend of Gaia
On his journey to Viseu, Ramiro II, the King of León, passed by King Alboazar's castle and met Zahara. He fell madly in love and decided to abduct her.
Outraged, Alboazar kidnapped Queen Gaia, Ramiro's wife, who, filled with jealousy,



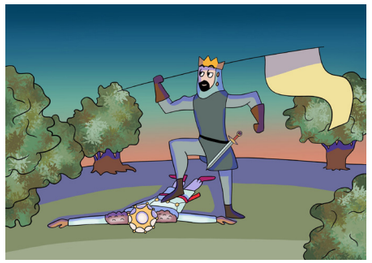


Fig. 29, 30 e 31. Ilustrations by nês Pereira
Artes Plásticas e Multimédia, ESEV, IPV

decided to seek revenge. He gathered his warriors and headed for Alboazar's castle. King Ramiro hid his soldiers in the pine forest and entered the castle. Brought before Gaia, he rushed to embrace her. At that moment, Alboazar returned and the queen, outraged by her husband's betrayal, handed him over to his captor.
Ramiro was to be thrown into the river, but at the castle battlements he requested to blow his horn as a last wish. He was granted this last request and the sound he made was very loud. It was the agreed signal with his soldiers. When they heard it, they rushed to their king's aid, set fire to Alboazar's castle and rescued Ramiro (Pinho Leal, 2006 [1873]).
Inês Pereira presents us with a work that was entirely digital, offering a more humorous take on this legend.

The Chestnut tree of love
The daughter of D. Lopo Soeiro, a wealthy man from Viseu, and the knight D. Martim de Sousa bid farewell, embraced and sobbing, by the Chestnut Tree of Love. D. Martim was off to war and his beloved asked him to meet her at that tree as soon as the war was over. The war ended but the noble warrior did not return. However, he honoured his lover's request: one year later, at the same hour, the ghost of the lovesick warrior appeared next to the chestnut tree. He returned every anniversary, circled the tree three times and called out, sobbing, for Don Soeiro's daughter (Vasconcellos, 1966).
Both Hevelin Page and Maria Cidália Parra chose to start with traditional exploratory drawings, and later transitioned to representations entirely created using digital techniques. Both artists approached the tale with a style reminiscent of children's illustration.

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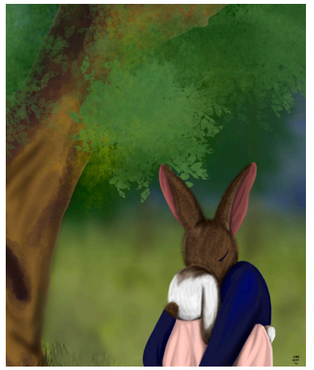


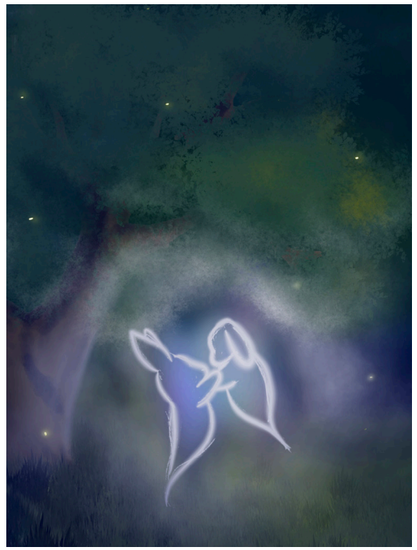


Fig. 32,33 e 34. Ilustrations by Maria Cidália Parra
Artes Plásticas e Multimédia, ESEV, IPV

Fig. 35, 36 e 37. Ilustrations by Hevelin Page
Artes Plásticas e Multimédia, ESEV, IPV

Presence

Catarina Carneiro de Sousa, IPV, CI&DEI, ESEV

The Presence exhibition presents the outcomes resulting from the participation of students from the Art and Multimedia (APM) Bachelor's degree programme at the Polytechnic Institute of Viseu - School of Education during the Education and Co-creation in the Metaverse Workshop Cycle. As part of this cycle, the second edition of the Co-creation Workshop for Virtual Environments involved different courses of the APM programme: the Contemporary Art Observatory and the Aesthetics courses, where students focused on theoretical research, and the Art and Multimedia Laboratory I course, where they concentrated on the practical aspects of the project. This combination allowed students to integrate the development of specific co-creation skills for the production of worlds and experiences in the Metaverse using the specific skills required in different areas of their course and their future careers as multimedia artists.

This exhibition comprises three installations, constructed within three specific skyboxes[1], each linked to a team of students/artists who developed them in accordance with the co-creative processes outlined in the first chapter (Sousa & Rodrigues, 2023). Two teams (Metro and 4 Seasons) were formed by second-year students, while the other team (Magic Islands of the East) was composed of first and third-year students.

Each of these projects, in its own way, explored the potential of the platform to evoke in visitors a true sensation of being within the artificial environment of the simulator.

There has been a widely accepted definition of the concept of "presence" since the 1990s, commonly described as "the experience of being there". This notion, attributed to Byron Reeves (Steuer, Biocca & Levy, 1995), stands as the most commonly accepted element in the concept established within academic circles. Carrie Heeter also refers to it as a sense of existing (Heeter 1992).

In the Metaverse, presence can be understood as the sense of existing in mediated spaces, a compelling feeling of being in a space different from the physical body's location (Biocca, 1997), accessed through technological devices and the Internet, and made possible by specific platforms and applications. While presence has often been associated with the use of these technological devices, Ijsselsteijn and Riva (2003) argue that it is actually a product of the mind, transcending the use of technology. This perspective was supported by later studies conducted by Biocca (2003), in which the author criticises the fact that research on presence tends to assume that the primary causes of psychological presence are the immersive properties of technology, suggesting the possibility of an internal experience of presence (in dream states, for instance).

Nevertheless, the sensation of presence implies the perception of a self that is distinct from the world itself or, more precisely, that is different within this world. This involves a perception of the self and the world and heavily relies on sensory input, but not exclusively so. Ijsselsteijn and Riva (2003) emphasise the importance of social presence and co-presence, particularly evident in collaborative virtual environments such as the IPVerso. While social presence depends solely on physical presence at its highest levels, co-presence always depends on it - you cannot have a sense of shared

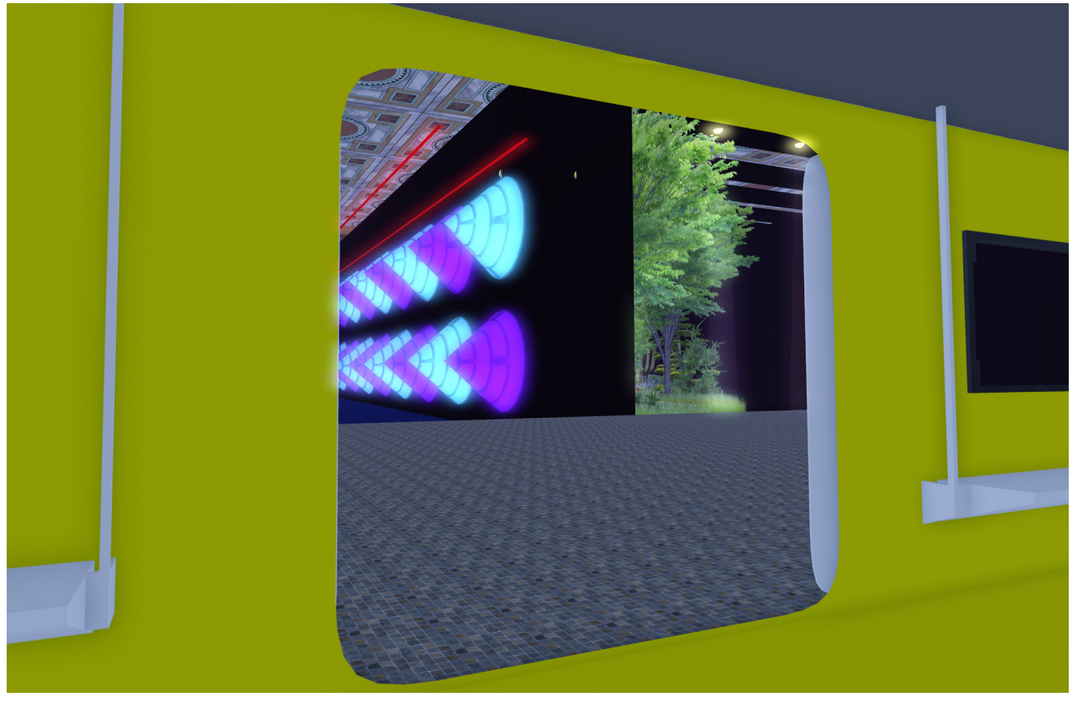
1 On platforms like OpenSimulator, we call a skybox any building with enough space to be visited by avatars, located at altitude, invisible from the Sim's terrain.

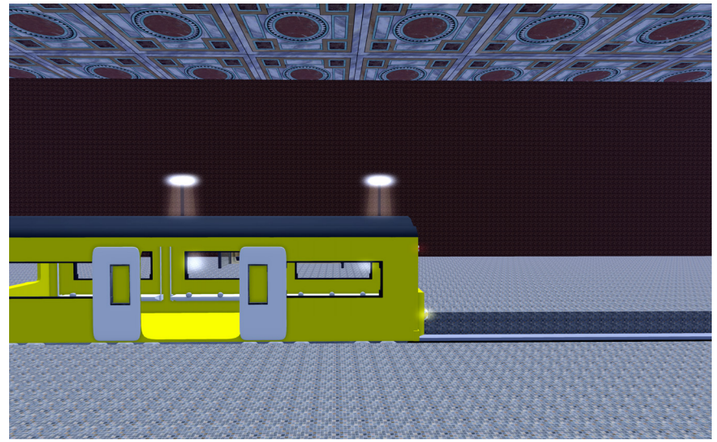
experience of the world without the feeling of being together in that world.
As described by António Damásio, our brain generates a sense of self from the interactions between our body and the world. Consciousness implies the presence of the self both to itself and in the world. The difference between self and the world is a crucial element in this process. Consequently, the more I interact with the world, the more I perceive myself within the world. The sense of mediated presence increases with the experiences lived in the virtual world, and interacting with the world reinforces this sense of presence - a world that recognises our existence is a world where we feel present (Sousa, 2017).

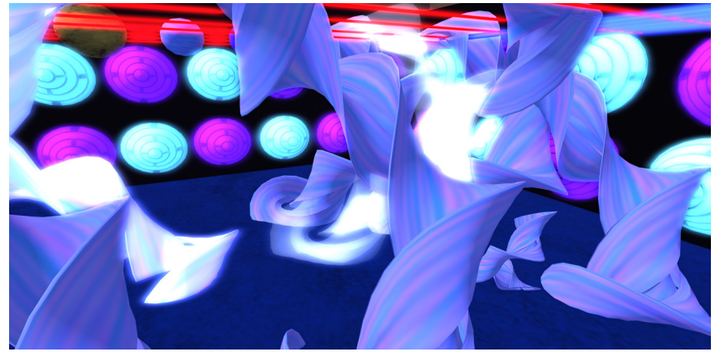
Metro

Ana Duarte, André Fazenda, Bruno Marques e Clara Simão
IPV, APM, IESEV

This project represents the creation of a distinctive installation whose primary purpose is to provide visitors with a virtual experience capable of stimulating their senses and immersing them in a world of sensations. The team developed an imaginary metro station, consisting of three different stops, each designed with a specific aesthetic, and created to engage each of the five senses.
In the execution of this project, visual and auditory elements were incorporated to guide visitors through an immersive virtual journey, designed to awaken all their senses. The sensory approach adopted emerges as one of the essential foundations of this installation. A strategic choice of sounds, textures, lights and colours, all coupled with interactive elements, was made to amplify the sensation that the virtual world is perfectly aware of the existence and presence of visitors.
Visual aesthetics, in turn, play a crucial role in this project. Shapes, colours and spirals were designed to envelop visitors





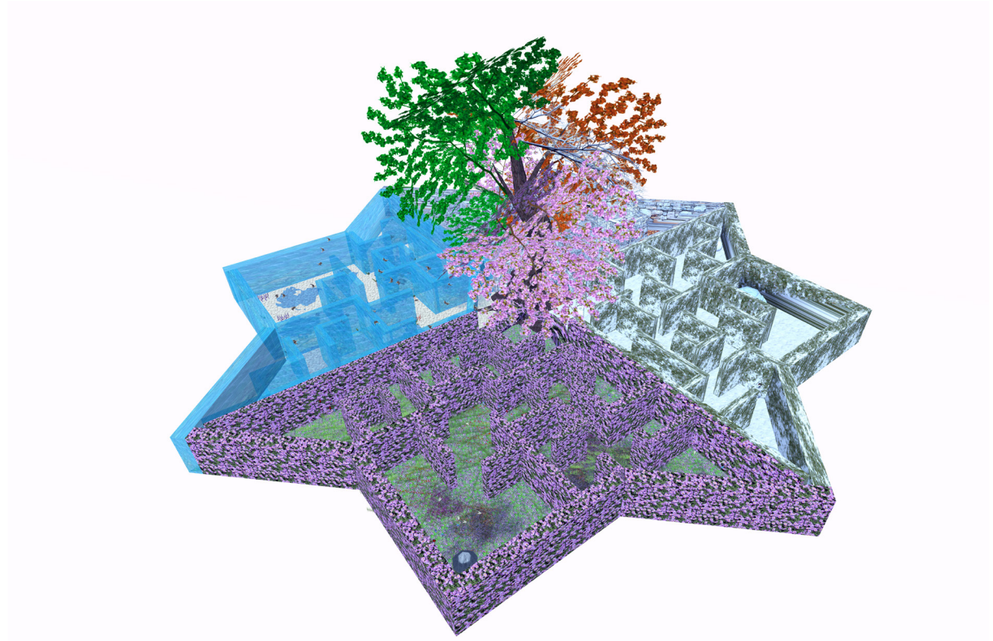


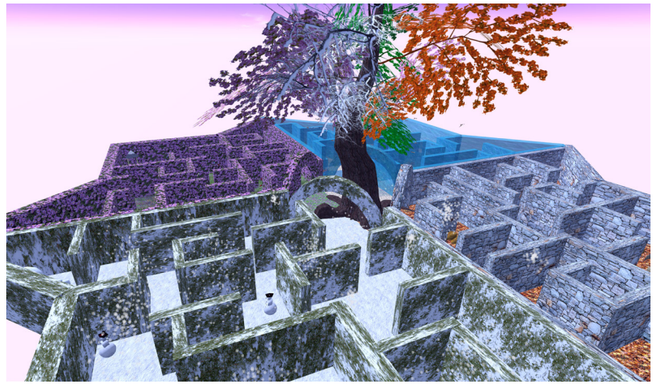
in a sensory embrace capable of awakening tactile and haptic memories. This results in the consolidation of the sense of presence within the virtual world created, making visitors feel immersed in a space where reality interweaves with imagination.

4 seasons

Daniel Peres, Marta Coelho e Susana Amaral
IPV, APM, IESEV

In this proposal, the team chose to design an installation that transports visitors into a labyrinth. The inspiration for this construction was drawn from the fort of Elvas, an impressive Portuguese military fortress dating back from the 18th century, which features the shape of a four-pointed star. Each of the star's points in this installation represent a season of the year: Summer, Autumn, Winter and Spring.
A distinctive environment was created for each season, filled with visual and auditory elements that evoke the typical atmosphere of each corresponding season. The carefully selected colour palette contributes to create a complete immersive experience. Visitors have the opportunity to explore a network of interconnected corridors and rooms, where the presence of virtual particles is intrinsically linked to their own physical presence. This phenomenon reflects the virtual world's awareness of the existence of visitors, through the use of sensors, and creates a more immersive experience.
The journey through this sensory labyrinth not only awakens the senses of visitors but also transports them to a realm where reality and imagination intertwine. Each season offers a unique experience, teeming with surprises and discoveries, inviting visitors to immerse themselves in the sensations and emotions associated with each period of the year, as they explore the nooks and secrets of this virtual labyrinth.





Magical Islands of the East

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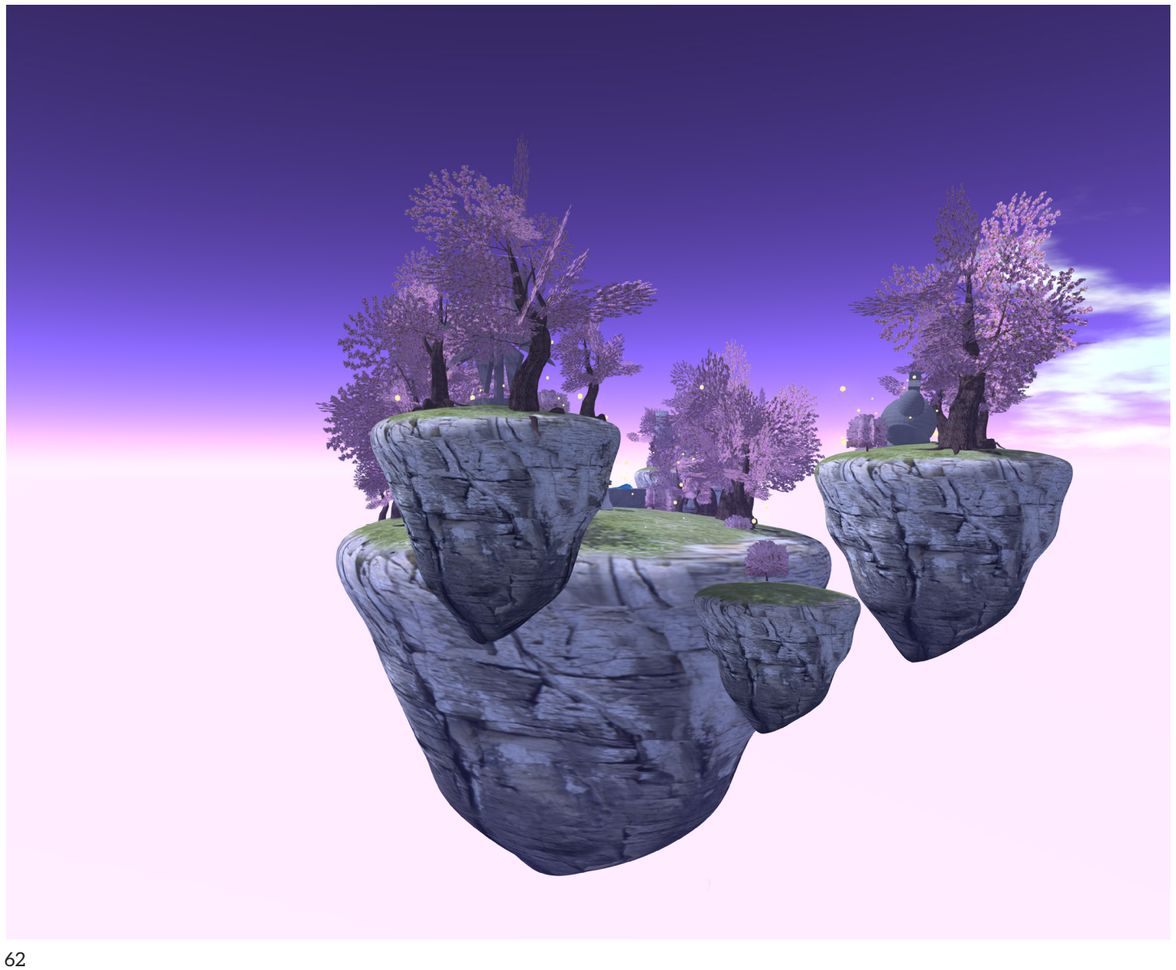
IPV, APM, IESEV

The primary goal of this installation is to create an atmosphere of serenity, freshness and tranquillity, with the aim of providing visitors with a precious moment of reflection and relaxation. The space was designed to allow visitors to immerse themselves in a peaceful atmosphere, where birdsong harmonises with the surrounding scenery. To achieve this intention, a series of floating islands was built, inviting visitors to explore their avatars' ability to fly, adding

a magical and fantastical touch to this unique experience. Each of these islands was conceived as a serene refuge, designed to mirror the unique personality of each



team member involved in the realisation of this project.
This approach becomes an opportunity to impart a personal and distinctive touch to each island, transforming the exhibition into a celebration of the creativity and individuality of its creators.
Each island represents a small world in itself, filled with details that reveal unique references and perspectives. As visitors explore this ethereal and enchanted space, they are invited to delve into the

minds and artistic expressions of each creator.

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Haven
OpenSimulator development as a context for learning programming

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Abstract
In this chapter, we analyse the potential of developing projects within Metaverse to enhance programming skills for students enrolled in the bachelor's degree in Multimedia Technologies and Design. We describe our experience as teachers who attended a co-creation training programme in virtual environments and who, throughout the development of the proposed project, were given the chance to reflect on the opportunities and challenges regarding its use in that context.
As a by-product of our experiments, we organised a set of technical possibilities showcased in the virtual environment itself, which could serve as a starting point for future explorations conducted with students. Our conclusion highlights the importance of introducing the Metaverse in this degree, despite acknowledging some inherent complexity.

Keywords: Metaverse, Learning, Higher education, Programming, Scripts, OpenSimulator.

Introduction
This chapter describes the experience of a group of teachers who took part in the Workshops on Education and Co-creation in Metaverse Cycle, envisioning it not only as an opportunity to start exploring the potential of this environment (Ball, 2022) but also to examine how it can expand the range of options that can be used to encourage students to delve into programming.
Learning programming poses challenges in Higher Education. In the Multimedia Technologies and Design[1] degree programme, depending on each student's academic background, this may be their first encounter with programming. On the other hand, most of the students entering this degree through non-technological areas often have a background in Visual Arts from their secondary education, so we anticipate some empathy with the development of activities within the Metaverse, since this environment can also be explored as a medium for artistic expression.
The authors of this chapter have been involved in various research projects that, in a less immediate yet strategically assumed approach, aim to contribute to improving the effectiveness of initiatives designed to foster algorithmic thinking and the application of creativity to problem-solving among younger audiences (Early, 2023; Figueiredo et al., 2022; Konakli et al., 2023). Such involvement also reflects the conviction that literacy in these areas is crucial for the development of skills relevant for the future of citizens.
In the initiative described in this chapter, as in those other endeavours, we seek opportunities that enable programming to be perceived as a means of achieving effects or behaviours in idealized universes. Exploratory approaches are also embraced, allowing deviations from the initial specifications to be interpreted as natural and contributing to maintain high motivation. In this sense, and from a pedagogical perspective, the focus may be placed on the learning that takes place during the process leading to a given production, as opposed to the tight assessment of compliance with the requirements set out in a specific briefing. Consistently, and particularly in the Metaverse, both the integration of serendipity and the strictly artistic valuation of the final outcomes are viewed as interesting possibilities. We believe that initiatives designed in this manner can generate different learning pathways and narratives as well as distinct appropriations of the spectrum of possibilities in programming, which might not even imply a comprehensive mastery of the specifications and functionalities of the specific development environment.
Competencies in algorithmics, and even in programming (e.g., at the level of language syntax, typical functions, paradigms), can be applied in other contexts, where learning can be completed successively.
While they are not subject of discussion in this chapter, there are other aspects involved in Metaverse development, such as the creation of virtual environments, 3D modelling, and animation, which are also highly relevant and addressed in other contexts within the aforementioned degree programme, including in the design of video games. In fact, due to the synergies with video game development, this text will draw some parallels and use common vocabulary where applicable.
The degree programme also includes

1 "Tecnologias e Design de Multimédia", www.estgv.ipv.pt/estgv/?v=199

the production of audiovisual content, particularly as part of the design of creative solutions for problems in the scope of multimedia. Virtual environments are clearly relevant as potential product of some of these challenges, but also as a platform for showcasing portfolios of productions created through other means.

1. Framework

The authors were part of one of the working groups that attended the cycle of workshops. As part of the overall project planning, the trainers prompted the groups to share a development proposal that would be subject to validation and collective discussion. One of the aims would be finding a common theme to provide some sense of cohesion between the different spaces.

The proposals were written at an early stage, when the groups were still unaware of what they could effectively implement, so speculative and alternative specifications were allowed. Figure 1 shows the transcription of the proposal we submitted on Moodle in response to this request, which we called "Haven". The informality of the writing reflects the context in which it was produced.

[WIP; Working Title: Haven]
A peaceful and quiet place, populated by small entities (NPCs; like "pond fish", for now) that only reveal themselves and/or approach if visitors move slowly (or sit?) and stay around long enough to create a sense of "familiarity".
The aim is to reward stillness and signal the benefits of contemplation. It would be interesting if we could complement these mechanics with aesthetics that would also contribute to the appreciation of the experience.
Non-realistic approach to aesthetics and physics; more "metaphorical".
We will try to explore the possibility of generating diversity among the occupants programmatically, e.g. varying their dimensions/proportions (within certain limits) and/or combining different components of their bodies and/or colours and/or textures in different ways – depending on what we come to perceive as feasible/programmable.
This way, we could make the production of NPC occupants scalable, without having to create them individually. We'll also need to figure out how/if it's possible to dynamically generate the occupants (spawning) and what limits to set to avoid compromising performance.
Even if we go ahead with the idea of NPCs resembling "little fish", we're still not sure if we want the environment to be "aquatic".
It could be interesting that the impact of a visitor's behaviour would be perceived not only in the reaction of the NPCs, but also in the space itself, perhaps in the periphery/proximity of the visitor. This might also contribute to indicating/explaining/revealing the mechanics of the interaction.
The proximity of several visitors (as opposed to individualistic behaviour) could also be a variable worth exploring. For example, two visitors in close proximity could have a more (positive) impact than the "sum" of their individual impacts when they are not together.

Fig. 1. Transcription of the group's initial proposal

outcomes, it is clear that the design of the solution also involves objectives set to validate the technical potential of the tool in implementing envisioned behaviours. These include incorporating randomness into the construction of diversity, dynamically generating and terminating instances of previously created entities, enabling communication between entities, and supporting reactions to events. Since, at that stage, we were still assessing the complexity associated with the implementation of each designed aspect, we adopted a cautious approach aimed at ensuring a minimum viable result within the project's timeframe.

2. Methodology

We determined that we should start by finding out how to programme each of the behaviours involved, adopting an incremental and iterative approach (Cockburn, 2008; Korsaa et al., 2001; Larman & Basili, 2003) and studying alternatives whenever appropriate. These alternatives, while potentially yielding the same apparent results, involve not only different programming complexities but also different levels of resource requirements for both the users' machines and the server itself. In this regard, it was also interesting to understand, albeit very empirically, which alternatives are scalable, i.e., which allow for an increase in complexity (e.g., population of objects in the world) without implying non-proportional increases in the resources used by the equipment.

In retrospect, it was evident that, during the explorations, it was important to learn more than what was strictly necessary to achieve each specific objective.

One of the decisions made was to start the process by using basic objects (namely those that can be created using the editor in Firestorm[2] , the adopted viewer), using them as placeholders and postponing the moment of their replacement with assets featuring the final artwork produced for the virtual world we wanted to create.

This modular approach to the two facets – programming the behaviours and applying the final artwork – allowed us to further refine the definition of the virtual world and, not less important, to adjust the complexity of the productions as the computational demands associated with the execution of the respective behaviours began to unfold.

Another relevant argument for maintaining the implementations as abstract as possible had to do with our interest in building and managing a showcase of technical solutions, intended for memory and future sharing with other audiences. We adopted best practices in code writing (Martin, 2009; Vartanian, 2022) to increase the likelihood of it being well perceived by third parties. This intention extends to the documentation, using comments interspersed in the code.

Figure 2 offers a glimpse of the space where we organized our elementary experiments. As can be easily understood, without a preservation mechanism, as we progressed towards the realization of the specific project, a natural and necessary decision would be to select, from among the technical possibilities, those that best served the project – and therefore dismiss others, already tested and documented, that could support other productions. Furthermore, even for the selected options, the theming specific to the project conceals their potential for exploration in other contexts, precisely because abstraction is lost.

On the other hand, in addition to the

2 wiki.firestormviewer.org

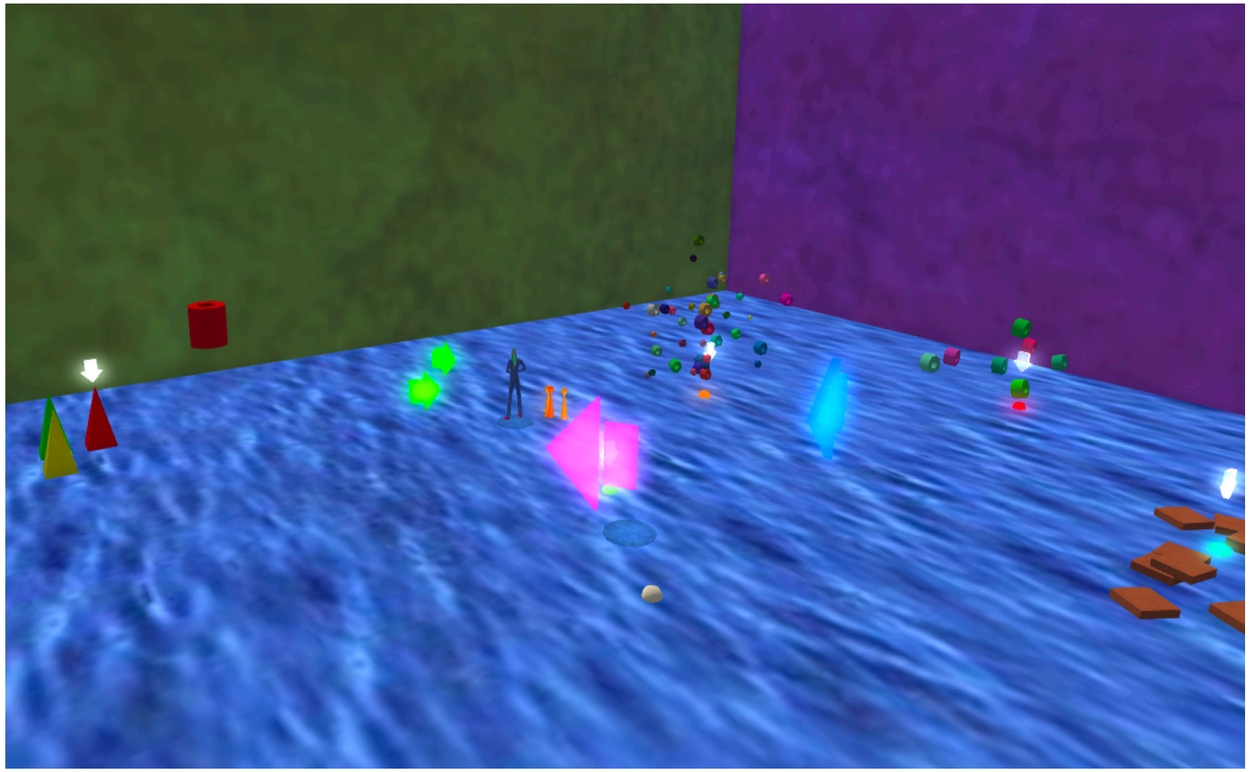

Fig. 2. Exhibition of technical solutions already tested and documented

complexity added by the exercise of preserving the portfolio of experiments, it became clear that managing the distance between the abstraction of the temporary objects and the "imagined thing" is an interesting challenge, especially when the outcomes are the result of teamwork, as it implies sharing a common envisioning. Although any divergences can ultimately lead to new creative explorations that are more interesting than those initially conceived, the need to maintain a common vision implies systematic dialogue between the group members. A positive counterpart is that each person, driven by the need to make their ideas explicit, ends up completing and organizing them in a more cohesive way, thereby strengthening their own construction, as recognized in other contexts (e.g., Fiorella & Mayer, 2013; Webb & Mastergeorge, 2003).

When this text was being produced, the group was concluding the production of the final assets, to proceed with the replacement of the temporary objects and their integration in a new space.

3. Programming

In OpenSimulator[3] , the platform adopted for the project, as inSecond Life[4] (a key reference in this context) (Sousa & Rodrigues, 2023), behaviour is programmed through scripting (Rito, 2023). In practical terms, it involves assigning actions to objects through code[5] snippets (*scripts*) that are activated at specific moments of the object's life (e.g., when it was created) and/or in response to its interaction with other objects (e.g., when they get close to each other), or by direct user intervention (e.g., touching, moving the avatar). The concepts of event and trigger – something that happens and to which the object is sensitive – also fit into this scenario.

The programming language is LSL (Linden Scripting Language)[6]. It bears many similarities, in terms of syntax, with most of the programming languages that are currently relevant to developers, notably those based on C and Java languages (Linden Research, 2022). This aspect is in line with our motivation because learning from the experiences within this environment is more likely to map into other contexts that are important to students. Conversely, individuals with some proficiency in languages with similar syntax will find it easier to adapt to this setting.

As depicted in Figure 3, the code can be edited using a tool integrated into the viewer (Firestorm, in this case). However, users can easily associate an external editor. This flexibility is interesting because it aligns with practices found in other development environments.

An aspect that we find less interesting and somewhat distant from modern development environments is related to version management and the workflow, which are not as conducive to rapid experimentation as expected. This limitation is justified by the inherent system model and is easily understandable, but it compromises incremental development and, by increasing the "cost" of each change, potentially discourages experimentation and parameter tuning.

For example, if an object (with all its behaviours defined by the attached scripts) exists in a user's inventory, it is understandable that experimenting with those behaviours will imply placing the object in the world (i.e., on the land; or, in other words, in the perceived space). However, with this operation, the connection between the object that now exists in the world and its original representation, located in the inventory of its creator, is lost. This means, first and foremost, that any changes made to the representation kept in the inventory will not affect the object existing in the world. Similarly, changes made directly to the object in the world do not impact the original representation in the inventory. Consequently, creating replicas of the altered object from its original inventory entry is not possible either. For readers who may be familiar with the concept in the programming domain, LSL language is not, at the present time , object-oriented.[7]

Inventory entries are not equivalent to classes and, therefore, the generation of an object from one of these entries does not result in the creation of an instance of that class. Please note that while this explanation centres around changes to the script code, the same principle applies to any other modifications (geometry, colour, etc.).

This dynamic in itself is easy to understand and poses no problems. For simple developments requiring minor changes, replacing the existing "version"[8] from the inventory, merely involves deleting the previous version from the inventory and

3 opensimulator.org
4 secondlife.com
5 Short for "source code", which consists of the text containing the instructions to be executed.
6 wiki.secondlife.com/wiki/LSL_Portal and wiki.secondlife.com/wiki/LSL_Tutorial
7 There are feature requests, from users, in this regard (e.g., Raymaker, 2007), but we have not found any indication that this is imminent. For object-oriented programming, see, e.g., Cox and Novobilski (1991).
8 We use this term, even though the concept is not supported in this programming environment, for ease of explanation and consistency with other development contexts.

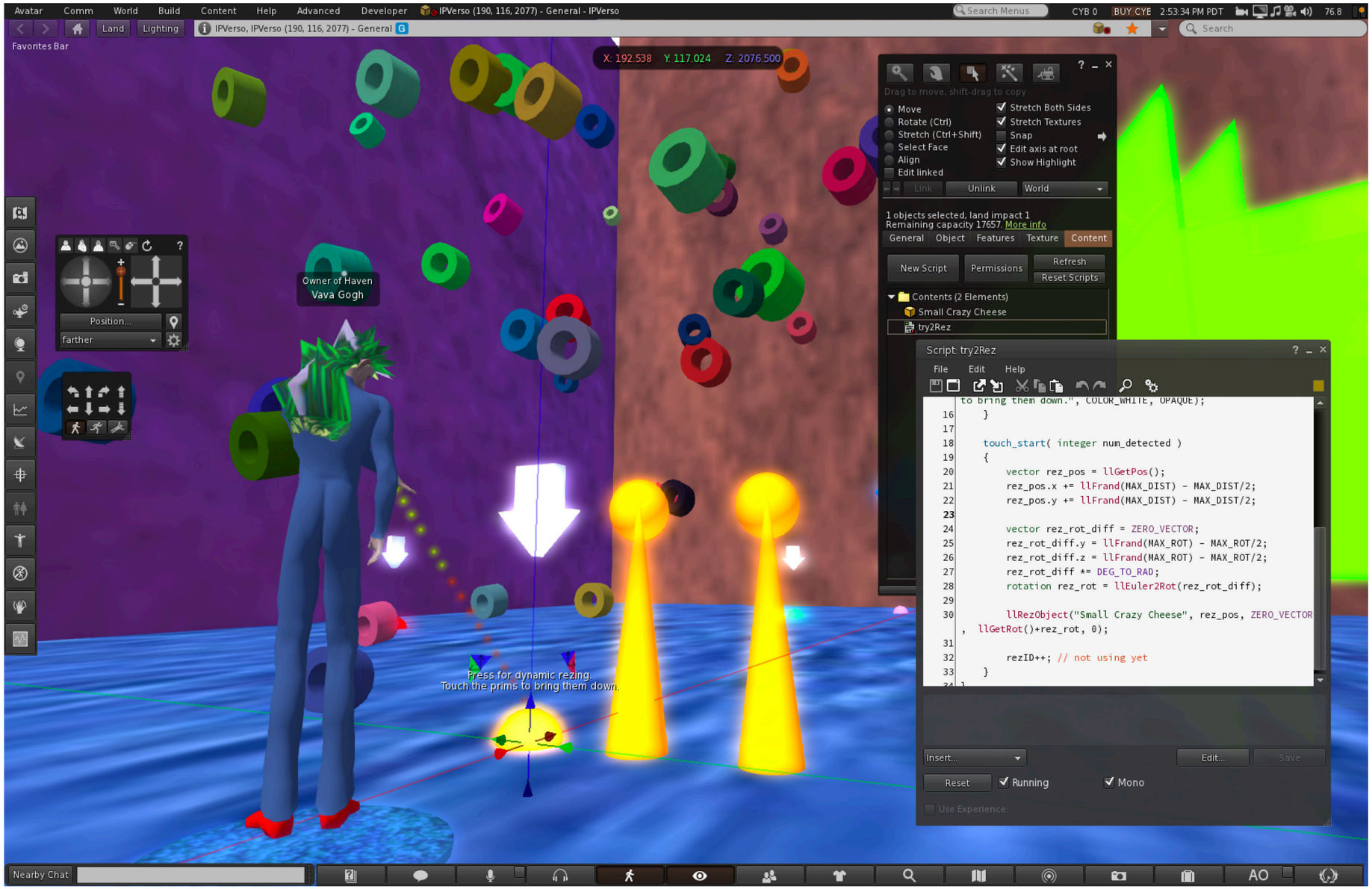

Fig. 3. Example of a script presented in the integrated editor

copy the new one there. However, even this step can potentially cause problems. For instance, if the developer copies the new version of the object to the inventory before deleting the existing version, there will be two entries sharing the same name (one that will generate objects identical to those before the change and another that will generate objects with the alteration). While it is possible to "rely" on the listing order of the entries as a way of distinguishing them, their objective distinction implies inspecting the respective scripts (presuming that this is where the differences lie). One solution is to alter the name of the entry in the inventory and/or the object before placing it in the inventory (e.g., adding an index representing its version or a given term showing the distinction). However, this approach requires the developer to incorporate such protocol into their workflow, which can represent a mental burden for those new to this type of development.

Another problem arises if the developer simply forgets to save a copy with their latest changes in the inventory (which can easily happen, for instance because they are working simultaneously on other related objects, or because they need to abruptly interrupt their work session): if they eventually delete the object from the world, changes will be lost[9] because the version in the inventory is not the same.

Regarding version management in the inventory, there is an even more intricate scenario that requires great caution from developers. In explorations such as the one tested in our original proposal, it is essential to emulate the appearance of new objects or entities based on some variable (time, touch, distance from a specific point, avatar speed, etc.). This notion is associated with the concept of "spawning" in other environments, particularly in video games. In this simulator, it involves the rez operation

9 However, if the developer is aware of what has been lost, the object can be recovered from the trash in the inventory. For similar reasons, there may also be repeated names in the trash.

(rezzing)[10]. For an object to spawn another, there must be a related entry in its own inventory. Thus, there is another location where the correct version of that entry must be contained, and, consistently with what has already been explained above, changes made in one of the inventories do not affect corresponding entries in the other. The workflow required to do so must also consider that, to add an entry to the inventory of an object, that entry must come from the main inventory (i.e., in this case, not directly from the virtual world). Consequently, any change made to the object one wants to generate implies that a (new) representation of it will be added to the main inventory (with the necessary version management, as previously mentioned), and then, a copy of this entry must be created in the inventory of the generating object (with similar attention to version management for that specific inventory).
As in the aforementioned cases, these steps can be understood and eventually become routine. Except for the possible impact on the development speed, they are not critical for experienced individuals. In fact, they may not even be a challenge for those merely interested in reusing code found online and have no intention of making changes (or don't know how to do so). However, since one of our initial motivations was to consider the use of projects of this nature to create attractive conditions for an audience that is just starting out in programming, it is important to acknowledge that these processes add an extra layer of learning to others that are already complex, such as mastering the language syntax and, more fundamentally, designing solutions using algorithms.
Moreover, considering that it is desirable that code is developed incrementally, and certain outcomes depend on parameterizing variables that involve trying different values through successive approximations until achieving the desired effect, multiplying the processes mentioned above for each of these "fine-tunings" inevitably entails effort and might discourage people from going beyond what they eventually perceive as reasonable.
Another kind of difficulty, also worth documenting, is the control of object orientation in space, closely related to the relevant coordinate systems in a given situation. In particular, the orientation of objects created directly within the virtual world may not be the same as when they are generated programmatically from other objects. While the documentation makes it possible to understand these differences and programme according to the intended results, there is some complexity involved. We believe that this level of complexity can also represent a significant barrier for some users who are just getting started.
We conclude this section with a very positive mention regarding the documentation available for those interested in programming in this environment. Our primary reference was the Wiki presented as the "LSL Portal" (Linden Research, 2023), which, despite being designed for development in Second Life, proved to be applicable.
Throughout the process, we encountered several difficulties related to unexpected behaviours of certain functions, which we eventually identified as bugs that had already been documented and in the process of being resolved. For the purposes currently motivating us to study this environment, this reality is not problematic (especially since there are reasonable alternatives or compromises). In fact, it represents an opportunity to expose students to the dynamics of maintaining (and using) a complex tool, as well as understanding the protocols and the significance of error documentation.
The exploration conducted so far has highlighted several promising ingredients that are transversal to other projects. In the following paragraphs, we will address some of the aspects we have experiment with and that could support a wide range of possibilities in creating content that depends on emulating spontaneity, variety, organic behaviour, communication, and reaction to variables in the virtual world. Naturally, this report may not come as a surprise to readers experienced in coding solutions in comparable contexts, but we believe that the list of opportunities may be particularly relevant to those who have not yet had the chance to conduct similar experiments.

10 The origin of the term is related to the vocabulary used in the 1982 film Tron, in which the term "de-rez" means to disappear (Robbins & Bell, 2008).

3.1. Interactions

As previously implied, the virtual world is populated by avatars and by objects that can represent entities with some semantically relevant interactivity or that simply behave as props. Avatars, as representations of the residents (a term that, in this context, refers to the users of the simulator), are present only while these users are visiting a specific space. They take on the role commonly referred to as Playing Character (PC), especially in video game design. Maintaining the analogy to that domain, entities that behave like characters, but are not directly controlled by the residents, function as Non-Playing Characters (NPC). For what it's worth, in visual terms, an NPC can have an appearance that is indistinguishable from the PCs.
In programming terms, the distinction is fundamental for several reasons. A developer can create NPCs and programme their behaviours by associating the respective scripts. However, the same cannot be done for visiting avatars (PCs). Therefore, developers need to find indirect mechanisms for the presence and actions of the PCs to manifest the desired behaviours. A standard way to achieve this, in this context, is to leave an object in the world containing the required scripts. If a visitor voluntarily takes that object, it will act as a proxy for its owner.
In our project, we have adopted a different approach that does not depend on any voluntary actions from visitors, because we believe that it adds value to the experience, in narrative terms. The implementation is somewhat more complex, but our concern lies in the fact that we have not yet tested the impact of this solution on the system's performance, particularly in relation to an increased number of visitors. If, when the opportunity arises, we conclude that it is critical, we may consider giving up the transparency provided by this solution, or we could try to design a diegetic approach to address the competition for space (perhaps in some way analogous to real-world practices that regulate visitor access to a particular resource or experience). Our current solution involves a proxy dispenser that, upon detecting the presence of a new avatar in the space, launches a proxy that gets enough information to covertly follow that avatar for as long as it remains in the vicinity. This way, we can make other entities in the world react indirectly to the presence of the avatar (and directly to the accompanying proxy).
As far as the NPCs are concerned, and in order to meet the behaviours included in our work proposal, we combined two distinct approaches, facilitated by the environment functionalities. One of them is based on object detection within a specific radius (a sensor mechanism), while the other relies on message transmission (through different channels associated with different communication objectives). These messages are sent and received at the programmatic level without the visitors realizing what is happening. In fact, the choice between

detection and messaging mechanisms, in cases where both are viable, is also transparent to users. The functioning of both approaches is based on event handling.

3.2. Dynamic generation

The dynamic generation of objects (rezzing) is an operation perfectly integrated into the development in this environment. The only aspect that we consider somewhat complex relates to a requirement we mentioned earlier: the need to ensure that a copy of the object to be rezzed exists in the inventory of the object running the script that determines under which conditions this instruction is executed.
An exploration we considered semantically relevant in our project, and that was not planned in our initial proposal, is that NPCs, in certain situations (when they are under extreme stress caused by PCs, for instance), may cease to exist (emulating the concept of death or escape), instead of simply moving further away or temporarily hiding. Programmatically, this effect is easy to achieve and consists in dynamically terminating the generated objects.
Terminating objects while generating new ones to replace them can contribute to creating the impression of a larger number of existing entities, especially if these entities exhibit distinctive characteristics. The technique described below can be used to assist the creation of such effect.

3.3. Randomness

In situations where the objective is to populate the space with several "copies" of a specific object/entity, the ability to introduce variety among them can lead to a more believable (and more organic) overall representation. In fact, as long as there is a minimum level of alternative representations (Ashby, 1958; Heylighen, 1992), it is possible to make users not consciously interpret the actual replications and, instead, perceive the whole as a set of different entities. In other words, to achieve this effect, it is not required that each entity is truly unique.
Variety, in this context, can be implemented across any observable (and modifiable) characteristic or combination of characteristics, including dimensions, shape arrangements, colour, textures, orientation, emitted sounds, and movement patterns.
These modifications can be made "manually" by the creator of the virtual world, directly acting on each of the copies placed in that environment during the design stage.
However, for extensive quantities of objects, and/or if they are meant to enter a scene dynamically, and/or if the variation itself should seem unpredicted, a programmatic approach is needed, to set the relevant characteristics in run-time.
In this context, (programmed) randomness gains relevance. This is a common feature in programming environments and typically involves receiving a different numerical value each time it is called upon. This value can be used to configure a certain variable (after scaling it to the desired range) or to map one of several possibilities based on the numerical range it falls within, using the equivalent of a correspondence table.
In the various contexts where randomness is used to emulate diversity, it is possible to improve the concept by not distributing the possibilities linearly. For example, this allows to create more valuable or rarer items, that do not result from any kind of interaction but rather from (apparent) chance.
In our project, we have systematically integrated randomness without encountering any setbacks. Besides applying this technique in various situations to influence the type of object to be generated and give each of the generated objects a unique character, we have also expanded the concept to the programmed behaviours in response to events. The idea is that by introducing variety in the reactions of each entity, we can create less mechanical and predictable environments, thus enhancing the user experience, who will be able to appreciate the sense of novelty and liveness.

3.4. Animations

A very effective way to add dynamism to objects, perfectly incorporated into the system, involves creating animations of the respective models that can be produced using external applications (e.g., Blender[11]) and triggered by specific situations defined in very simple scripts.
In fact, in the case of avatars, there are predefined animations (which can be replaced) that make it look like they are in constant "movement" and even support some gestures, like raising a hand to greet.
It is possible (and quite common) for creators with no programming knowledge to associate animations with their objects because the scripts involved are simple and can easily be found online, allowing them to be reused through simple "copying and pasting", even if one does not fully or partially understand the code. However, if a developer wants to modify this code or, more significantly, if they want to programme behaviours that depend on other aspects of the virtual world, they will need to be able to interpret the existing code and, ultimately, write their own.

Conclusions

We described our involvement as a group of teachers attending training in the Metaverse.
Alongside our desire to start exploring this environment, we sought to identify opportunities to use the development in this context as an additional tool we could use to motivate our students towards programming. The initial expectation, which was confirmed later on, was that we could take advantage of an unconventional approach that is directly rewarded by the resulting audiovisual production.
During the learning process, aimed at creating a space where occupying entities would assume programmed behaviours, we built a by-product whose longevity might surpass the immediate outcome. This product consists of a showcase of technical solutions, supported by programming, exposing approaches that can be adopted in this development environment. The purpose, which has emerged throughout the experiment, is to maintain a tool that will enable us to tangibly present a wide range of possibilities to students. Naturally, even though we already have a set of options that exceeds our instant needs, in a future that does not compromise the fulfilment of the current project, it will make sense to expand this resource and possibly opening it to other participants.
Moreover, the division between an initial phase of iterative and incremental exploration of the potential of behaviour programming, using abstract objects with features increasingly closer to the entities intended to populate the world that was being created, and a second phase, where these objects would be replaced with models featuring the final artwork, aligns with the methodology we set out to adopt.
Based on our experience so far, we tend to argue that using this development scenario to promote programming skills is more advantageous if introduced at a stage where students already have some proficiency in the field. We have realised that the platform's workflow introduces some inherent complexity that may divert attention from the primary focus on algorithmics and coding. This is particularly true when attempting to develop solutions beyond simply importing scripts provided

11 blender.org

by third parties (which, in any case, does not align with our purpose), or when more complex editing is required.

We appreciated the methodology used by the trainers in this project to manage the working groups and we plan to adopt a similar approach in future initiatives with our students. Allowing individual explorations to accommodate each group's motivations while ensuring everyone's commitment to contribute to a common universe has the advantage of imposing some restrictions that prevent the creative process from becoming too far open and, therefore, potentially paralyzing (Schwartz, 2007). In addition, it provides each group with an opportunity to invest in some dimension where they differentiate for the others and bring value to the collective work. This form of indirect competition creates conditions for success based on criteria defined by the participants themselves.

In conclusion, we believe integrating the Metaverse into the literacy of Multimedia Technologies and Design students is very relevant. Besides its increasing strategic value in the market that they will soon enter, it offers synergies with other environments and content covered in the curriculum, and can even be used as a showroom for their productions.

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Cartoon characters in the IPVerso

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Abstract
This report seeks to document the creation of a three-dimensional installation known as “Bonecos” (Cartoon Characters) within the IPVerso, Craft World, OpenSimulator environment. This project was created as part of the "Education and Co-creation in the Metaverse" initiative, included in the IPV Inova e Inclui. IPV I2 Project (POCH-02-53I2-FSE-000014). The construction of this space is a response to the challenge launched during the Co-creation in the Metaverse workshops. Conceptually, it draws inspiration from the creation of autobiographical comic strips. It also plays with the idea of "watching cartoons" or watching animation shows broadcast on television channels and aimed at children and young people. The methodology employed for the creation and construction of the installation was necessarily exploratory, as it marked the first attempt at creation in the Metaverse. Despite the initial naivety and inexperience, it proved to be an enriching experience, once again affirming the effectiveness of active learning experiences and the remarkable creative potential of virtual collaborative creative environments.

Keywords: Animation, Active learning, 3D modeling, Metaverse

Introduction
This chapter focuses on the experience of creating a three-dimensional installation in the IPVerso, Craft World, OpenSimulator, which was called “Bonecos”. The first stage was used to provide insights into the name, context and background of the installation. Then, the process of creation, based on an exploratory creative methodology, is briefly described. It concludes by acknowledging the project's limitations, identifying potential future works, and by drawing some conclusions.
"Ver bonecos” (watching cartoons) is a colloquial expression that refers to the act of watching animated shows aimed at a child and teenage audience, usually broadcast on television channels. The term “Bonecos” is used with this specific meaning in this installation, but there is another meaning attached to the word: “bonecos” also refer to objects that, to a greater or lesser extent, mimic the human form and are used (for lack of a better term) by children when they play. In this case, they would be the equivalent to puppets or dolls. The “bonecos” presented with this installation are both, i.e., they are cartoon characters in the sense that they were modelled inspired by animation shows like Betty Boop (Fleischer & Natwick, 1930-2018), Adventure Time (Ward, 2010-18), The Amazing World of Gumball (Bocquelet, 2011-19), and Amphibia (Braly, 2019-22), along with McBess's illustrations and animations, and they are also puppets/dolls that were created almost for the fun of it, in an effort to improve the author's 3D modelling skills. They are also fictional autobiographical representations and responses to the author's perennial research question - how do we tell our stories in different media? Other manifestations have been created by the same author to respond to that question, including comic strips, short interactive animations, small video games and, in this case, 3D objects that can be animated and printed - the “Bonecos”.

1. Framework
1.1. Visual and interactive autobiographies
The way we tell our stories through different media and formats has always been a source of fascination for the author of this project. The way stories are told using visual and/or interactive media and formats has been addressed by various researchers (Jenkins, 2008; Murray, 2000; Nash, 2012; among many others). Three dimensions have been considered: autobiography, visual narrative and interactivity.
How do we know that the story we are being told is autobiographical? How do we know if it portrays facts that occurred in "real life"? According to Lejeune (1989), we cannot know for sure. What happens is that we place our trust in what the narrator of the story is telling us - the person who signs the story and identifies it as his/her own. We put our faith in this person and sometimes we end up feeling deceived. There are some markers of the autobiographical narrator, like, for instance, the use of the personal pronoun “I”, the provision of data and places that can be verified, and the signature on the cover that matches the narrator's name.When we address visual narratives, these markers can take on different forms: consistency in self-representation, the most expressive mark on paper, the use of materials that (we imagine) the author of the biography has at his disposal to draw over, such as phone book pages or graph paper notebooks (El Refaie, 2012; Figueiredo, 2013). However, we are aware that these

markers can be, in both written and drawn narratives, a form of fiction: what should we make of Harvey Pekar (Chaney, 2011) who had multiple artists drawing his autobiographical stories? When we talk about a film director, if he is not the main actor, does it mean that it is not an autobiography?

it in order to live the story, and in which we are faced with various possibilities? How can we consistently tell autobiographical stories when the events worth telling don't happen at the pace we wish them to occur?
The author began to draw other stories - about invented characters. These are autobiographical stories of these fictional

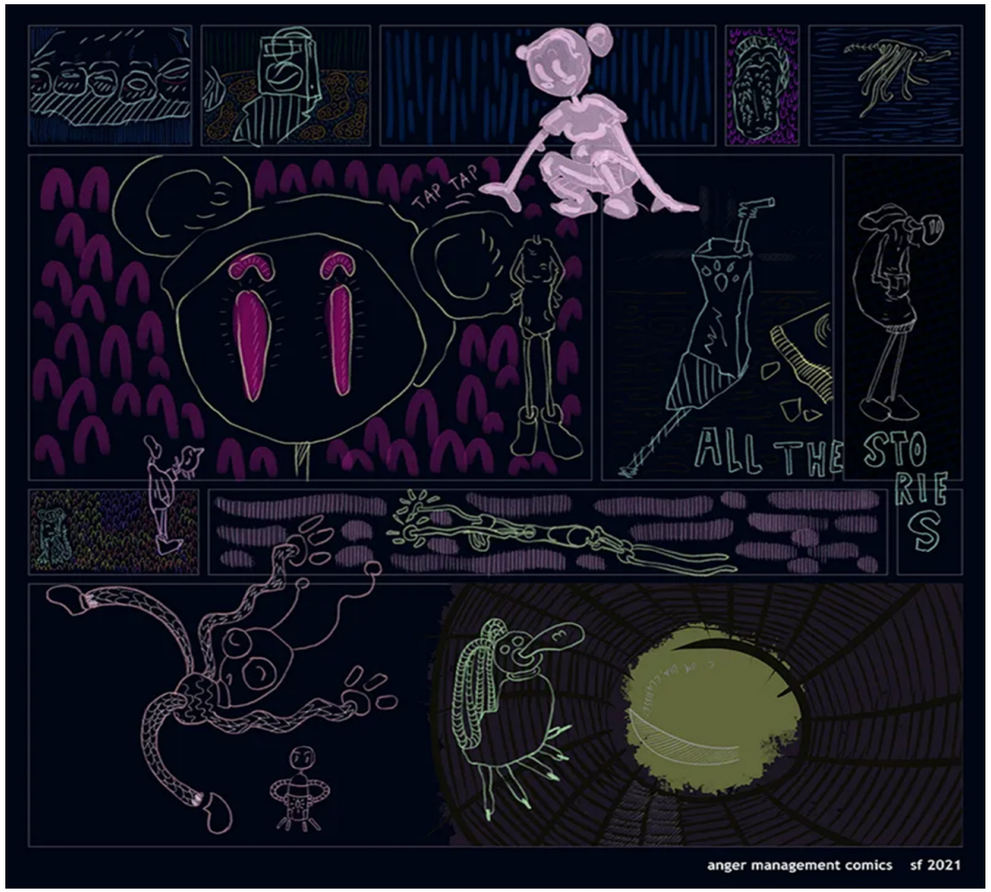

Fig. 1. All The Stories, Anger Management Comics, 2021

Considering all these dilemmas, the author of "Bonecos" made her best to make the concept even more complicated. What if we're talking about interactive autobiographies, in which the user is not the author of the experience, but has to embody

characters, in which they would be the authors of these stories and illustrations. That's how "All the Stories" (figure 1), the predecessor of "Bonecos", happened. These stories are no longer autobiographical since they don't tell the stories of those who

actually draw them, although those people are the fiction and the context created.
For "All the Stories" to work, it was necessary to create the characters who inhabit the stories and tell their stories. There have been many cartoon characters over time, some of which have actually become 3D printed (figure 2).

1.2. Watching cartoons
Now, we delve into the inspirations behind this project, the cartoons broadcast on television channels aimed at children and young people. There are five primary inspirations: Adventure Time, Amphibia, The Amazing World of Gumball and Betty Boop, and McBess's illustrations and animations.
Adventure Time is a highly acclaimed animated series developed by Pendleton Ward

most is the solutions found for the design of the characters. The characters are very diverse, featuring a wide range of shapes, colours and movements, but they stand out for their simplicity and elasticity: there are no bones (for example, Jake the dog can assume any shape), human anatomy is creative, and the movements are flexible and fluid. The fantastical, non-trivial spaces and the way they are designed are also an inspiration for this project.
Amphibia is a series created by Matt Braly (2019-22). It focuses on the adventures of Anne Boonchuy, a girl who is far from home and her usual environment (which we assume to be ours), and who now lives with talking frogs in a frog society.
In terms of character design, Amphibia is simple and its animation is fluid, much like Adventure Time. For this project, we are mostly interested, once again, not only in the diverse and sometimes monstrous characters, but also in the design of the environments (colourful swamps, glowing mushrooms).

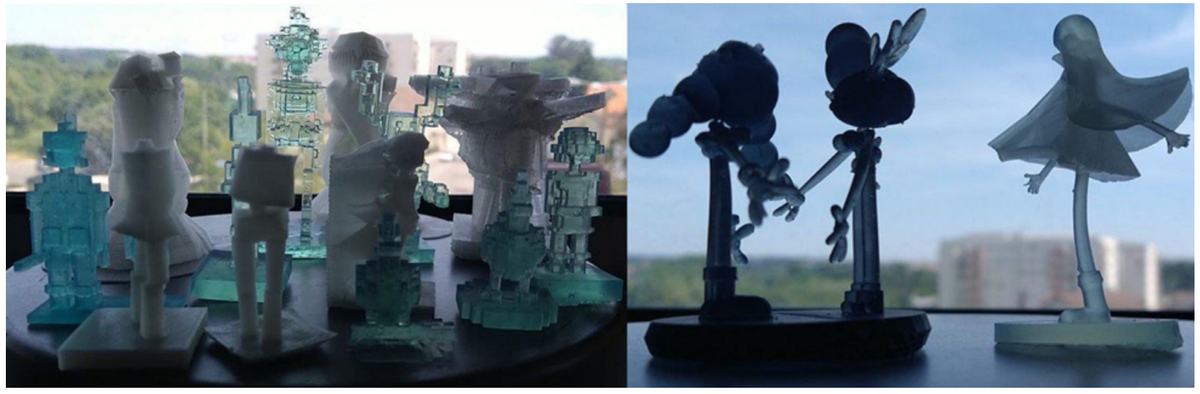

Fig. 2. Previous characters and some final printed characters

(2010-2018). It follows the adventures of Finn, a human, and Jake, his magical dog brother. This remarkable series is inspiring for many reasons, but in the current context, what interests us the

The Amazing World of Gumball was created by Ben Bocquelet (2011-2019). It portrays the daily life of a family living in a suburban setting populated by characters drawn and animated in different styles and using different techniques: some are expressive

drawings, while others are vector drawings, 3D creations, or simulate puppets. The show also features human actors with accessories, and more. This variety can be observed in the multiple and diverse “Bonecos” that have found their place in the IPVerso.
The influence of Betty Boop (Fleischer & Natwick, 1930-2018) on the final installation of ”Bonecos” is evident, initially in the choice of black, white and grey for (almost) every element of the installation. In addition to this characteristic, Betty Boop's supporting characters are often strange, tubular, fluid, and an attempt was made (perhaps inadvertently, at first) to emulate this context in the IPVerso.
The chapter concludes with a reference to McBess, a French illustrator, musician and animator. The author often draws in black, white and grey and is also inspired, we dare say, by the animations from the 1920s and 1930s, much like Betty Boop. The design and animation of the characters, with tubular, boneless hands and feet, also hark back to the history of animation. Finally, there is a subversive dimension to the artist's work.

2. Construction of the installation

The “Bonecos” installation began as a collection of... dolls/puppets. Although they shared common inspirations, the” Bonecos” were created over the course of a year without following any initial scheme or concept. They were modelled as a way

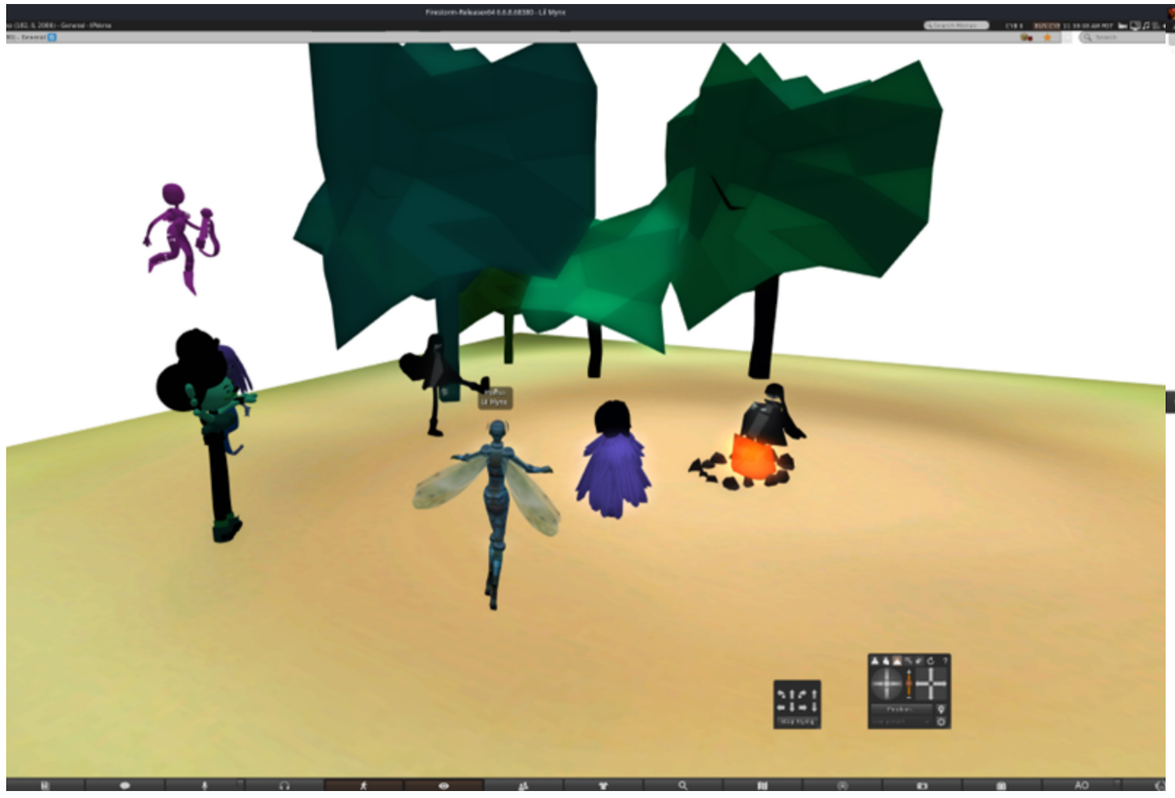

Fig. 3. The first attempt to create a forest where all the “Bonecos” could meet

to improve the author's 3D modelling skills. They followed an undefined legacy from “All the Stories”, in the sense that they were created as characters who would live stories and present them as their own, as if it was a theatrical doll play.
The construction and modelling methodology was quite diverse, as each “Boneco” was a new exercise. Classical modelling strategies were used, incorporating, in addition to meshes, metaballs and curves, digital sculpting, painting exploration and textures and material assignment, modifiers for various purposes, and other strategies for the creation of objects using Blender.
The initial aim, within the context of the IPVerso, was to collect these “Bonecos”, animate them and present them as avatars for those interested in visiting the space.
The animation of the models as avatars has not been completed yet, though there is still a possibility that it may be achieved in the near future.
Nevertheless, in response to the challenge launched during the Metaverse creation workshops, they were made available in a static form within a designated space. This space would have to be designed and thought out to fulfil two functions: to showcase the “Bonecos”, and to create

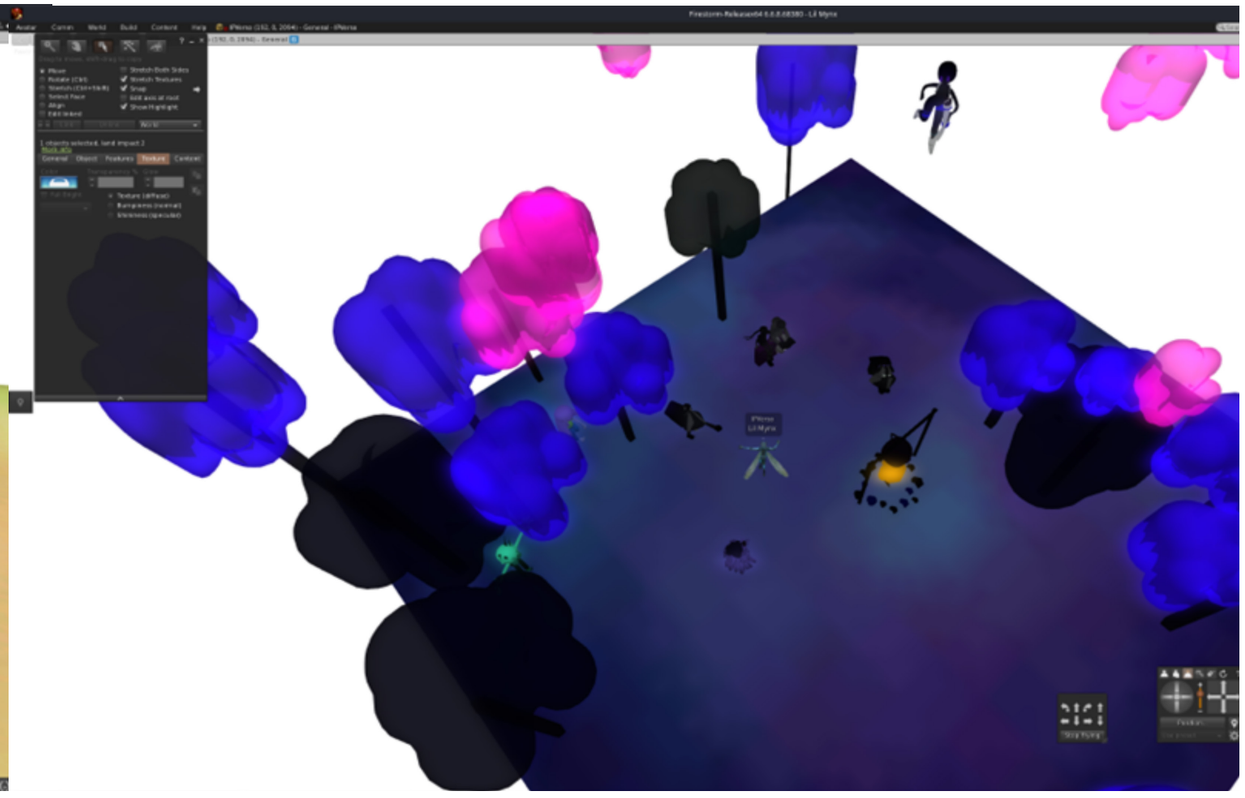

Fig. 4. The second attempt to construct the forest- Standardised and organised colours, shapes, and objects.

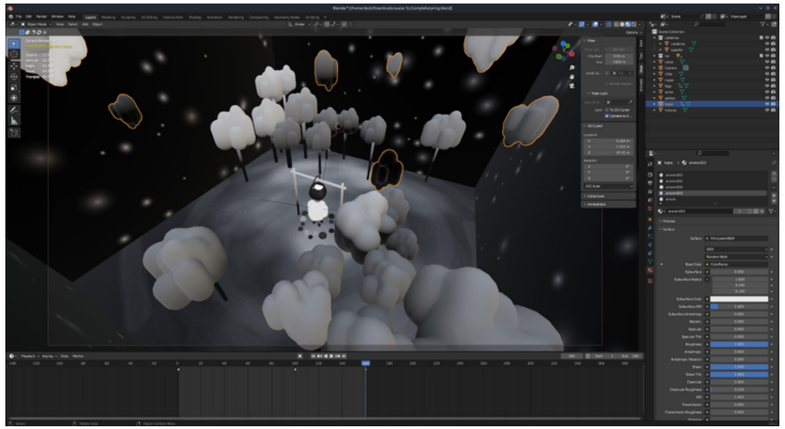

Fig. 5. Black, White and grey- Project in Blender

Fig. 6. Black, White and grey- render from Blender (Cycles)

Fig. 7 “Bonecos” in the IPVerso!

a link to the (fictionally autobiographical) stories of all the “Bonecos” - why have they all gathered here? What are they doing?
Assuming that all the “Bonecos” are somehow connected, they could meet on a deserted island, at a business meeting, or at a music festival, in a game arcade, in a library... aboard a spaceship... We went for the typical forest setting, paying (yet another) tribute to Saturday morning cartoons, which often featured fantastic stories set in medieval fantasy worlds and in forests, huts, taverns, castles, and others we know all too well.
The first attempt to create the forest in a colourful way (figure 3). An attempt was made to standardize the colours and, using Blender, to organize the trees, ground and other elements to make them easier to import and place in the assigned white cube (figure 4).
The first findings showed that the “Bonecos” that were not coloured (such as the Witch walking, the Witch sitting, the Witch and the Boy) were not completely visible. Consequently, experiments were carried out with the glow parameter in Craft World and it was observed that the “Bonecos” that glowed emitted a somewhat green and ghostly light, reminiscent of the cathode-ray tubes that, in the 80s, were used to broadcast black and white cartoons from the 20s and 30s. As a result, the decision was made to render the entire space and the remaining “Bonecos” in grey and black and white, to see how they would stand out and integrate into their space (figures 5, 6 and 7).
The decision was made to create some particle systems (in the fire, on the ground - like fireflies - and in the cauldron and mugs), since, at the time, the installation lacked animation or movement and it was felt that these elements would add to the gathering atmosphere in the woods. Additionally, a "radio" was modelled for the same purpose. It broadcasts live and streaming shows from Youtube – LIVE, such as Oldies playing in another room, it's a great night (Open window, cricket ambience), on Nemo's Dreamscapes channel, playing music from the early 20th century and featuring the sounds of crickets. The cauldron and mugs emit coloured, purple particles, and visitors are invited to take their mug with them and let themselves be inspired by the atmosphere.

3. Limitations and future work

The construction of this project encountered some difficulties, which can be attributed to two factors: the ad-hoc creation of the characters without prior reflection, and unfamiliarity with the tools used - the aim was to learn how to use Blender for 3D modelling and also to learn how to create in the Metaverse.
Many hours were spent experimenting with menus, losing objects and reloading them, and seeking assistance from the person in charge of the IPVerso to locate three Spacemynxes who had disappeared into space (appropriately enough! Reality is as strange as fiction) never to be seen again.
The workshop on optimizing 3D objects was essential considering that the original “Bonecos” were monstrous creations, assembled without due attention to their size and organization.
For a project that falls within the research line of visual, animated, autobiographical and interactive narratives, we are faced with a space that is definitely not animated and lacks interactivity. This will be the aim of future works. There are plans to create

simple animations for some of the “Bonecos”, using the strategies explained in animation workshops. We are also looking forward to the workshops on creating and customizing avatars.

Conclusions

The creation of the “Bonecos” installation emerged in response to the challenge posed during the creation workshops in the IPVerso. It aligns with the author's research focus - how do we tell our stories in different media?

Although the “Bonecos” themselves were constructed over an extended period of time, they are creations linked to the autobiographical comic strips that served as a foundation to “All the Stories”. They are characters who are going to tell their autobiographical stories using, much like Harvey Pekar, others to represent them (in this instance, the author of the project). What establishes an autobiography (whether textual or visual) as authentic is a pact of authenticity (Lejeune, 1989; El Refaie, 2012; Figueiredo, 2013), which can easily be transcended.

The concept of autobiography begins to unravel when we start to question parts of it: if we want to tell our autobiography interactively, what experiences will others have that are different from those we want to tell? If the autobiography is drawn by others because I only know how to write, does it still qualify as an autobiography?

The “Bonecos” are also inspired by Adventure Time, Amphibia, The Amazing World of Gumball, Betty Boop and the work of McBess. "Ver bonecos" is a colloquial expression that refers to watching cartoons, usually aimed at a child audience. In this project, we have drawn from both contexts: "watching cartoons" and "playing with puppets/dolls".

Above all, the entire experience has been enjoyable and enriching. It is widely accepted that hybrid, active and collaborative learning experiences are stimulating and motivating, ultimately leading to authentic and meaningful learning (Beck et al., 2023; Morgado, 2022; Moreira et al., 2020).

As for the practical objectives of learning 3D modelling (using Blender) and learning how to create within the Metaverse, we believe them to be in progress, but also (partially) achieved in a manner that have surpassed our early expectations. We still need to deepen our knowledge in animation (currently underway), to create (more) interactive elements and learn how to make customized avatars available in Craft World. These will be the next goals to be achieved.

In the more distant future, there’s great potential to further our creative work within the Metaverse, perhaps in a more collaborative fashion. Other possibilities within the Metaverse could involve a more diverse range of projects with students, such as observational painting of the Metaverse worlds, creating textures for 3D models, among other (as evidenced by the other creations that can already be found in the IPVerso).

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1st IPVerso Conference Cycle

Welcome to the IPVerso

The 1 st IPVerso Conference Cycle took place on February 28th, 2023, marking the introduction of this simulator to the entire academic community and the general public. The inauguration occurred in a hybrid format, with some sessions held at the Auditorium of the Polytechnic Institute of Viseu - School of Education and in the IPVerso.

During these conferences, we explained the concept of the Metaverse and discussed the potential of this simulator as well as its strengths and limitations.

The sessions included presentations on its architecture and explored the specific roles that architecture can play within the Metaverse.

We were introduced to the design process used for the MILHO exhibition, an exhibition of illustrations of legends and tales of yesteryear, within the simulator. This exhibition revealed that it is perfectly possible to use the simulator to plan activities that will be executed in the tangible world.

We inaugurated the A/R/T, artists, researchers & teachers exhibition, which was specifically designed for the virtual environment. We became familiar with the concept of a/r/tography, a practice that combines art-based research with education, where the roles of the researcher, artist and teacher are indiscernible. The artists/researchers/(future) teachers engaged in the project shared insights into the works they had developed for this exhibition within the IPVerso.

Objectives

- To inaugurate and introduce the IPVerso simulator to the academic community;
- To explain the concept of the Metaverse;
- To discuss the characteristics of this simulator, along with its strengths and limitations;
- To present and explain the specific features of the IPVerso architecture;
- To share the design process employed in the MILHO exhibition and elaborate on the contributions of the simulator;
- To introduce the A/R/T exhibition, the artists/researchers/teachers involved and the works they have developed;
- To address and discuss the concept of a/r/tography.

Programme

- Opening session (Ana do Souto e Melo)
- Message from the President of the ESEV
- What is the IPVerso? (Catarina Carneiro de Sousa))
- Architecture in the IPVerso (Mariana Sá)
- Presentation of the MILHO exhibition (Lília Basílio and Catarina Carneiro de Sousa)
- Q&A (moderated by Sofia Figueiredo)

Break: 30 m

- Presentation of the A/R/T exhibition (Catarina Carneiro de Sousa)
- Another day at work (Afonso Paiva and Isabel Lopes)
- Art and Mind (Inês Queirós and Rita Paz)
- A portrait of domestic violence through art (Joana Lemos and Liliana Gonçalves)
- Protecting Identity (João Lobão and Marco Ferreira)
- Sorority (Joana Monteiro and Inês Soares)
- Colouradd Museum (Abel Saraiva and Ana Alves)
- Five Senses (Clotilde Silva and Kateryna Holovko)
- Authentic Praise (Sara Ferreira and Teresa D'Aragão Santos)
- Q&A (moderated by José Pereia)
- Closing session (Ana do Souto e Melo)

1st IPVerso Conference Cycle

Another day at work

Abstract Painting in Collaborative Performance

Afonso Almeida Paiva, IPV, MEEVTEB, ESEV
Isabel Leal Lopes, IPV, MEEVTEB, ESEV
Ana Souto e Melo, IPV, CI&DEI, ESEV
José Pereira, IPV, CI&DEI, ESEV

Abstract
This work delves, on the one hand, into the investigation of the Abstract Expressionist painting movement and, on the other hand, the contextualization and dynamics of performance within a collaborative production setting. Based on the research focusing on the state of the art and its analysis, a performance was carried out, combining the creation of an abstract-style painted canvas with a critique of an increasingly individualized and impersonal world of work environment. The primary objective of this project was to understand how performance can be combined with other forms of artistic expressions.
Various authors were consulted, both for the state-of-the-art research phase to support the project's options and to create the descriptive memory. This study holds great relevance due to its potential applications in educational practice, particularly with regard to the demands of the teaching profession where creativity, among other skills, is highly required. This skill becomes particularly important in teaching artistic subjects like Visual Education and Technological Education. Teachers are also expected to integrate human, social and ecological values into their teaching practices, using art as a means to achieve these goals.
The project described below aims to pave the way for creative activities that intersect visual art, theatre and performance. Its importance also lies in strengthening the educational possibilities of performance. We believe that this artistic expression, within the school context, will help foster attitudes of creation and recognition of values tied to diversity and to reestablish connections with others, time, nature, society and the world. Performance relies on the participation of others to be fully realized. With the results obtained and as authors/participants in this study/project, we hope to inspire fresh creative approaches in the teaching of the arts.

Keywords: Abstract art, Artistic creation, Collaborative performance, Visual Education and Technological Education.

Introduction
This article constitutes an academic study focused on combining the artistic possibilities of painting and performance. A collaborative performance was developed by merging these two art expressions. In this collaborative initiative, different languages converged to create a unified artistic manifestation. In itself, performance creates a connection between the viewer and the artistic object. However, in this study, we introduce a performance that will culminate in the creation of another art object: an abstract painting. Whereas in abstractionist painting, the artistic process focuses on the production of the artwork, in performance art the focus is placed on its impact on the audience. Performance establishes an artistic dialogue between the work and the audience, and often among the participants within that given performance. Can collaborative art emerge even in the absence of verbal dialogue/communication among its creators?
Performance, when regarded as a possibility for training in educational dynamics, has the capacity to stimulate curiosity and foster critical investigation among students, since this artistic expression paves the way for active engagement within society and the world. Performance is both learning and training, and the process of self-education necessarily implies transformation. This change will manifest in the development of reflective and critical learning processes, contributing to the achievement of the genuine purpose of educational action (Conte, 2014).
What follows, is a brief and non-exhaustive "state of the art": a literature review exploring the emergence and evolution of the different abstract painting movements, as well as the theoretical exploration of some manifestations of collaborative performance.

1. Framework
1.1 Abstract painting: movements and Styles
Abstract expressionism, also known as the "New York School", is characterized by its highly expressive painting technique. Renowned artists like Pollock became famous for using the so-called "action painting" technique, in which "the artist poured and projected paint onto a canvas previously fixed to a wall or the floor. This allowed him to move around the canvas and almost "become" the gesture of the painting" (Murteira, 2000, p. 367). At the same time, a similar movement was emerging in Europe, particularly in France: informalism or "art informel".
While "equally abstract and expressionist, this trend was identified as "formless painting" and therefore devoid of figurative or geometric references" (Nunes, 2010, p. 226). These two movements, while separated by the Atlantic Ocean, combine elements of "abstract art" with aspects of "German expressionism". As with all aesthetic currents, over time and in manner, they represent ruptures and successions relative to those that precede them.
Abstract art originated in Europe in the late 19th century, intimately associated with painting, in opposition to Renaissance figurative art inspired by Greco-Roman tradition. The historical context in which this movement developed was profoundly marked by World War I and, subsequently, by the Great Depression of 1929 and its socio-economic and cultural consequences (Bernard, 1999).
Painting reality objectively would certainly entail bringing to the canvas the harshness

and difficulties that were already painful to endure. Therefore, painting began to seek representations that distanced themselves from concrete reference points, evoking a subjective reality that the observer was responsible for defining and interpreting (Hauser, 1988).
Kandinsky stands out as the reference painter in this burgeoning abstract art movement. In his work, one can discern the metamorphosis between the influences that inspired his work and the transformation it underwent. Through the use of vibrant and intense colours, distorted/realistic angles, and interplays of light and shadow, objective reality becomes subjective. In addition to these resources, the paintings also incorporate abstract forms.
Nature and objects are distorted to convey feelings of love, anguish, hatred, fear and loneliness. Ernst Kirchner is regarded as the pioneer of 'German Expressionism'. He and other expressionist artists produced works infused with romanticism and symbolism where one can observe "the exaltation of the artist's feelings – of his fierce existentialist anger - and his tragic reflection on the universe" (Bernard, 1999, p. 20).
While not a member of German expressionism, it is worth highlighting Edvard Munch and his seminal work, the series of four paintings known as “The Scream”. Another noteworthy German painter is Hubert Roestenburg with his 'Portrait of Andrea. Edvard Munch’s art "sought to depict people who breathe, experience emotions and love, by transforming the profound feelings and anguish of modern humanity into images" (Fonseca, 1990, p. 84).
After this brief foray into the foundations of abstract expressionism, it is time to refocus on the primary objective of this review: how to lay the foundations for creating a collaborative abstract painting in a performance context.
Symbolism and expressiveness stand out as two of the most distinctive marks of abstract expressionism as an artistic movement. This style is characterized by an celebration of materials and gesturality in painting, generated freely and impulsively, "advocating an art of subversion and rejection of all aesthetic conformities" (Pradel, 1999, p. 19). Both the American and European movements find their greatest exponent in painting. Thus, the pictorial artworks within this style abide by their own unique characteristics:
• Spontaneous creation: the artist allows room for chance and the unexpected in artistic creation;
• Automatic painting: planning or sketches have no place in the work to be done. This is what has become known as the informality of abstract expressionism;
• Technique(s) hold equal or greater value and relevance than the artwork: dripping, action painting and energetic techniques emerge as possibilities for creation;
• Use of abstract geometric shapes;
• The appeal to the sensory awakening of the viewer through the use of large-scale canvases.
Through this style of paintings, we can discern an art form in which the aesthetic character does not depend on a concrete model, truly paving the way for imagination and a multiplicity of interpretations.
We also wish to highlight Jean Dubuffet’s work because of his importance. First and foremost, he should be referred to as a 'performing' artist, with a diverse creative and artistic path. He was the precursor of what he called 'Art brut' - 'raw art'. With this term, he alluded not only to his own creations but also artworks produced by creators from diverse backgrounds, divergent from the prevailing artistic currents and styles. One of Jean Dubuffet's artistic missions was the search for pure and anonymous art, detached from external influences.
To achieve these objectives, the artist devoted time and effort to compiling "artistic production from patients in psychiatric hospitals, in the context of treatment for a mental illness" (Ferreira, 2019, p. 22). This explains why, even today, there are many projects and studies that connect “Art Brut” and artistic intervention with mental illness issues.

1.2 Performative art and collaborative performance
Performance art is a significant form of avant-garde art that developed in the late 1960s, characterised by its unique features. In this art form, the artist becomes the art object. It is "an ephemeral form of expression based on action, movement and physical presence, combining the body and space with the fourth dimension: time" (Graça et al., 2010, p. 234).
Performance becomes a powerful communication tool, a form of protest against the inconsistencies of an individualistic society, addressing themes like racism, homophobia, feminism and violence, among others. Through the artistic exploration of these issues, the aim is to generate debate and reflection that can bring about a positive impact on society. Performance is defined as a versatile art form with a social, political, environmental and cultural nature, intensely theatrical and connected to everyday life. In performance, life and staging intertwine (Aidar, 2022).
We refer to performative art as an expression of original, creative, ephemeral, non-reproducible art and creative freedom. Within it, the boundaries of art itself disappear, transcending physical, mental, moral, ethical or aesthetic limits.
In general terms, performance can be described as an original, controversial, and non-repetitive event that connects artistic activity to the realm of emotions. It is a manifestation of art that exceeds rational limits and boundaries, an experience of confronting physical boundaries; a dialogue of energy where spectators and artist collaboratively construct the work, sharing authorship; a constant reflection on the body and the unconscious, breaking rules and disrupting prejudices, "transforming life through art into an artistic thing" (Santos, 2017, p.7). Most importantly, performance provides a platform for reflection and public debate on some of society's most divisive issues (Graça et al., 2010).
Here are some additional aspects associated with performative art:
Hybrid language: it blends elements of theatre, visual arts, installation, music, among others:
• The evocation of gestures and situations from everyday life;
• The ephemeral nature of the work, fleeting, existing for a specific time and date;
• The transformation of the artist's body into an instrument of artistic action.
Shechener (2006, p.20) also adds the following functions:
• Entertainment;
• Building something beautiful;
• Shaping or modifying an identity;
• Building or educating a community;
• Healing;
• Teaching, persuading and/or convincing;
• Dealing with the sacred and/or profane.
A collaborative performance usually involves two or more actors who share the same ideas and ideology. One of the earliest duos was formed in 1969 by the sculptors Gilbert and George (Gilbert Prousch, 1943, and George Passmore, 1942). They were perhaps the best-known and most popular English performers, becoming known as “living statues”. This epithet emerged in 1970 when the duo first presented their

performance “Singing Sculpture” at the Nigel Greenwood Gallery. They appeared on a table, dressed identically and with bronze-painted faces. Making robotic, mime-like movements, they danced to “Underneath the Arches”, a popular British song from the 1930s. With their performance, they drew attention to the existence of homeless individuals who, during the Great Depression, had to sleep under the arches of railway stations. Their aim was not only to break down barriers between the public and art but also to criticize the British elite’s indifference to the difficulties faced by a large part of society during that period.
Another duo worth mentioning in the realm of performance is composed by Marina Abramović and Ulay, who, after their meeting in 1976, embarked on a series of challenging and physically extreme performances called “Relation Works”. Through their performances, they aimed to nullify their individual egos, becoming one. Marina Abramović refers to her art as "an art made of truth, vulnerability and connection" (Abramović, 2015).
In 1977, during their performance titled “Relation in Time”, they sat back-to-back for 17 hours 'tied' together by their intertwined ponytails (CoBo, 2020).
In the performance AAA-AA, that took place in 1978, they positioned opposite each other, making long sounds until both artists' screams became out of sync and weakened from the constant yelling. This performance symbolises aggression and abusive power within marital relationships.
In “Rest Energy”, they sought to demonstrate the unwavering trust that should exist between people who love each other (Leotte, 2017). Ulay and Abramović (1980) stood on opposite sides of a taut bow and arrow, with the arrow pointed at Abramović's heart. The tension in the artwork also reflects the life of this couple.
In their performance “The Lovers” (1998), Ulay and Marina started from opposite sides of the Great Wall of China, walking for 90 days until they met at the centre of the wall. After covering more than 2,400 km each, they silently embraced and bid farewell (CoBo, 2020).
However, among the performative events by these two artists, “Imponderabilia” (1977), was the one that we chose to analyse more thoroughly. Ulay and Abramovic stood face-to-face and completely naked in a narrow doorway of the Galleria Comunale d'Arte Moderna in Bologna. In order to enter, visitors had to squeeze between them. According to Leotte (2017), the artists wanted to expose prejudices about sexuality. This performance divided public opinions, as their bodies occupied nearly the entire entrance space of the gallery.
Anyone visiting the gallery had to choose which one to make eye contact and physical contact with. Some people simply walked away from the gallery entrance and did not enter, while others hesitated before eventually entering and other visitors pass through the door several times.
Female audience members were the most hesitant and when they entered, they chose to lean against Marina. For their part, men deliberately leaned against Marina. Reflecting on this duality, Casals (2021) suggests that by leaning against the female figure, male visitors might have been seeking pleasure, demonstrating their superiority/power and/or expressing a fear of exposing their intimacy to another man. This author also mentions that, by using their naked bodies as artifacts, Marina and Ulay posed a bold question to each spectator: do you perceive nudity as something natural or as taboo?
A reference to Christo Vladimirov (Bulgarian) and Jeanne-Claude (French), recognised as pioneers in environmental art, is also due. These artists conceived radically new forms of public art. When we mention them, one immediately thinks of huge natural and human monuments 'wrapped' in fabric, as in “The Pont Neuf Wrapped” (1975 to 1985). On this bridge connecting the two banks of the Île de la Cité, they installed 41,800 square meters of polyamide fabric, possessing a silky appearance and a golden sandstone colour. The fabric covered the entire structure of the bridge (side parts and vaults of the twelve arches, parapets, pavements and all the lampposts).
Finally, we would like to highlight another duo, Tehching Hsich and Linda Montano, who, in one of their “Art/Life One Year Performances” (1983-84), remained tied to each other for a year without being able to physically touch. They were connected by a 2.40-meter rope tied around their waists. This performance is an extreme example of the so-called art of commitment or art of resistance. According to Rezende (2016), this work reflects Tehching's view that life is nothing but the passage time, where the artist plays a single role - consummating time until his eventual death.
To conclude this section, where we briefly covered abstract painting and performance, we turn to the words of Arnold Hauser: "Every work of art is more or less a critique of life, an attempt to free it from its irregularity, to make it more coherent and unambiguous, if not more perfect" (Hauser, 1988, p. 101). It is the artist's sense of incompleteness in the face of the world that drives him to create art.

2. Descriptive memory

The purpose of this Descriptive Memory is to illustrate and provide insights into the creative process, its joint execution and the respective evaluation of the collaborative performance we called Another day at work.
To conceive and describe the project, we drew inspiration from the working methodology for the visual arts proposed by Bruno Munari (1981). To develop this approach, Munari started with the premise that "designing is easy when you know what to do". According to Barbosa (2013), Munari's project methodology proves very useful, particularly in artistic fields, as it emphasizes that the focal point in project execution should be on finding the solution rather than on how quickly one gets there.

2.1 Creative proposals

Our initial step was designing a four-hand painting using acrylic paint in a performative manifestation mode. The purpose of the collaborative performance is to draw the viewers’ attention to social aspects open to criticism. The name we gave our project, Another day at work, aimed to prompt us to reflect on the way work environments are so often perceived. They are often marked by competition, by the pursuit of perfectionist individualism for personal “success” and “excellence”, where “me”' becomes more important than “us”.
So, we deliberately sought to evoke in those who attended our installation the sense of individualism that prevails in society. After the cold cordiality of photographing ourselves next to our future “joint” painting, we began the performance with our backs turned, literally speaking. The working environments mirrored each other and similar in equipment and accessories were used. Without speaking to each other, each of us would, in turn, approach the canvas and, for one minute, paint what we wanted. One’s work would overlay the other’s, as if to say "my work is better than yours".
We also tried to evoke the notion of work routine through almost mechanical and expressionless gestures and steps. We also wanted people to perceive the growing frustration and irritability stemming from

the unexpected outcome emerging on the canvas each time one of us was painting. This was how the project Another day at work was conceived - two people, under the same material and temporal conditions, would “build” an abstract painting, each on their own, yet doing so “collectively”.

2.2 Experimentation

The selected space had to meet certain requirements, such as: having adequate lighting, a wide area with office furniture, painting materials, and access to a sink or equivalent space with a water source for cleaning painting materials. This selection process involved photographs, measurements, painting materials and other pre-existing items, light tests, among other aspects. We also decided to dress formally (wearing dark blue pants and blazer paired with a blue t-shirt).

The performance was scheduled to last approximately twenty minutes, accompanied by the sound of a wall clock marking time with its 'tick-tock' noise, symbolising the time an individual spends in a typical workspace. We remained seated at our desks with our backs turned, each with our own laptop. Each of us would take turns and have 1 to 2 minutes to intervene on the canvas, for a total of eight intervention periods each. No prior

Fig. 1. Ready to start the performance

studies of the painting, lines or colours to be used were conducted. There would be no communication between us (verbal and/or non-verbal) and nothing we would to paint had been agreed in advance. The end of the performance would be determined by 'unanimity', with one of the participants deciding to pack up their belongings and leave. Audiovisual and photographic documentation of the performance would be recorded.

2.3 Implementation

Once we checked the materials, the position of the canvas and the operability of the camera, we posed together side by side with the blank canvas positioned between us. Together, we would collaboratively travel parallel roads (figure 1).

The absence of a script led to a sense of latent risk. From the first strokes on the canvas (figure 2) there was no turning back. Without communicating, we just knew that each of us had to continue filling the canvas. And the performance unfolded with alternating performances and brushstrokes that were entirely the result of the artistic spontaneity of the moment. A reference should be made to psychic automatism, a concept developed by the surrealist theorist André Breton. This was a technique used by painters of this movement, in which the artist reached into his unconscious, allowing his brushstrokes to flow freely and immediately with whatever came to his mind (without any mental blocks or constraints). "Artists from the Surrealist

Fig. 2. The first brushstrokes

movement, such as Max Ernst or André Breton, sought in the idea of the unconscious as a way to think and create the most profound type of art, and even going so far as to act like a madman" (Ferreira, 2019, pp.

22-23). Through our painting, we attempted to experience this artistic freedom and alienation in which the brushstroke breaks free from the traps set by our psyche. To cover the entire canvas and achieve a sense of completion, we performed eleven times, spanning 60 minutes. We exceeded the number of interactions and the time initially planned: eight interactions in 20 minutes. It is worth noting, however, that we did not feel the passage of time as we entered a state of artistic flow, strongly engaged in the act of painting. Figure 3 illustrates some of the final brushstrokes.

2.4 Evaluation

True artistic production requires a constant awareness of the work carried out during the different phases and stages of a project. It also presupposes the no less important possibility of improvement, reformulation and redoing. All of this becomes possible only when evaluation is present in the different stages of execution and, more formally, at

Fig. 3. Final brushstrokes

the end of the project.

Thus, to assess the Another day at work project more objectively, we turned to a SWOT diagram or matrix (figure 4). SWOT evaluation methodologies are widely used in the business world to assess projects. In line with the metaphor of our performance, we wanted to blend art with a business logic irony.

Internal (Organisation)	***Strengths*** •The project worked as a performance; •Our proposal was completely original; •It was a truly collaborative working experience (both in the preparation and conception of the work).	***Weaknesses*** •Even thoughthe outcome was interesting, the painting may have been too small for the audience to see; •The rotation between the participants slowed down the performance and resulted in a decrease in its pace/operability; •It took us much longer than anticipated to conclude the performance.
External (Environment)	***Opportunities*** •This concept can be applied to different contexts and not just to painting; •The project has a socially critical dimension (individualism and the absence of dialogue in our current society); •This type of projects can be executed in diverse settings, spanning from streets to a studio or school.	***Threats*** •The paintingin itself may fail to evoke the concept we wish to explore in the performance; •The proposal or the method chosen could have been more innovative; •It was quite demandingboth in terms of space and the time required for the preparation.

Fig. 4. SWOT Diagram of Another day at work.

In any case, this evaluative approach, given its highly graphical nature, allows for a quick understanding of what went well, what did not go as well, what is or what were the constraints. At the same time, this analysis paves the way for other artistic/performative possibilities that may not have previously considered.

Following this SWOT analysis, it is important to note that this performance did not have an audience. Consequently, we were unable to accurately assess whether we achieved the intended performance experience, i.e., we could not identify potential advantages and/or problems associated with showing this work to the public.

3. Final product

On a formal level, the final product of this performance was a square canvas with a side

length of 1 meter, profusely painted with acrylics in a non-figurative composition. The fact that the painting resulted in a chromatic composition dominated by brownish tones may have a connection with Educação Visual (Visual Education) classes, particularly those taught under the Light/ Colour work unit. What we achieved with the painting in this study's performance is an example of subtractive colour synthesis, because "whenever we mix pigments, we create a subtractive mixture. The resulting colour loses its ability to reflect light and colour" (Graça et al., 2010, p. 43).
This explains why the predominant colours in the painting are greys, blacks and browns. The same example of subtractive synthesis can be observed in the process of mixing primary colours (cyan blue, magenta and yellow) - when combined, they create the colour black (Figueiredo et al., 2017). Based on this knowledge, one could effectively develop activities with Visual Education (EV) students centred around colour and colour theory, using concrete examples from artworks (such as this performance) and delving into the life and work of other artists.
The final product, as expected in a project of this nature, turned out to be unexpected and unforeseen. The guiding concept was to create a work through deconstruction. The canvas that began to be filled with tentative drawings from both participants, ended up completely filled with overlapping patches and disorganized strokes aiming to undo the previous drawings and artistic intentions. Thus, our abstract painting emerged (figure 5). A certain brownish tone is evident, despite the presence of a palette of cheerful and lively colours, standing out in touches of yellow, red and blue. We cannot be certain that the absence of communication between the participants compromised the final product. We feel that anyone who looks at the canvas painted" four hands" does not sense any ambiguity or lack of dialogue about ideas or opinions.

Conclusions

The work we decided to undertake was a "four-handed" painting within the context of a performative production. In this silent performance, we highlighted the creative and active nature of the artwork. The visual context chosen by the two members of the group was formal, allowing the image to naturally unfold into a painting. More importantly, we believe that this artistic expression provided a platform for reflection and possible public debate on issues pertaining to the contemporary world of work. As we bring this research to a close, we are aware that we have only lightly scratched the surface of the endless world

Fig. 5. Painting Another day at work

of abstract expressionism in its various nuances and protagonists, as well as the domain of collaborative performance and its interpreters.
This work could represent a starting point for further research. Among other topics we would have liked to delve more deeply into is the concept of 'A/r/tography'. This interdisciplinary dynamic known as A/r/tography (art, research, teacher) represents a form of methodological research rooted in the arts and focuses on breaking down standardized criteria in an attempt to pave the way for new ways of understanding and studying art (LeBlanc & Irwin, 2019). This way, our performance may have aligned with these principles, allowing us to draw certain conclusions. Inspired by A/r/tography, this performance could be used as research data in the development of performative activities within the context of the degree in "Educação Visual do 2.º Ciclo do Ensino".
In summary, we believe that collaborative art can exist in different contexts and take on different forms, even when there is no direct communication. While in the performance Another day at work there was dialogue and alignment of the proposal prior to its execution, those involved let the art unfold through a process of overlapping interventions and creation. We feel that with our performance we were able to produce a genuine example of collaborative art.

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Art and Mind

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Abstract
The aim of this chapter is to investigate how Art Therapy can contribute to improving the mental health of young university students. To achieve that goal, a selection of images associated with the state of the art on "Art and Mind" was made. Those images were then used to establish a series of comparisons with different authors, primary related to the fields of mental health and the arts. Based on this analysis, an artistic intervention project was conducted with students from the Polytechnic Institute of Viseu - School of Education. In this project, young students were invited to express their emotions through art. The implementation of one of the parts of the project, designed to facilitate our understanding of the artistic intervention process, led us to conclude that young people are experiencing a growing sense of anxiety and apprehension regarding their future. In this context, it becomes increasingly important for young people to express what they feel, not only to feel better about themselves, but also to raise awareness within the community about this issue.

Keywords: Anxiety, Art Therapy, Depression, Mental health, Stress

Introduction
This chapter describes the implementation of a project that aimed to address two interconnected aspects: mental health and Art Therapy, which are viewed as mediums for expression and representation of the human being. The underlying goal of this project was to create a space for experimentation where the public was invited to participate and interact in the creation of four artistic panels. Once completed, the panels were exhibited and showcased side by side to the target audience, which in this case encompassed the entire school community of the School of Education (ESEV).
In the first section of the paper, we delve into the research carried out regarding the state of the "Art and Mind" art, focusing on mental health and Art Therapy issues. In addition to the literature review conducted on these topics, several images were collected to serve as a starting point for this work.
The second section of the paper includes a descriptive memory, outlining the different phases of the project, which relied on the active methodology known as Problem-Solving Method.
This section encompasses the preliminary sketches and the exploratory work carried out, and provides some examples of the artistic intervention implemented at the ESEV.
The final section of this work will feature a simulation of the exhibition of the final project, accompanied by a detailed description of said project.

1. Framework
The first part of the work offers an integration of theoretical frameworks encompassing various topics, focusing mainly on the two aspects that matters the most for the realisation of this project. Consequently, the state of the art is divided into two important subsections: mental health and Art Therapy.

1.1 Mental health
Mental health and mental health issues have gained significance in analyses and discussions about society, even though they have always existed and are part of human history and the human condition. Conditions related to mental health remind us of the vulnerability of the human mind and the adversities it has to face on a daily basis and to which individuals react in so many different ways (Silva, 2018).
In general, when contemplating mental health, we think about a person's well-being. According to the Portuguese National Health Service, Mental Health is defined as the "foundation of well-being and refers to a level of cognitive or emotional quality of life, or to the absence of a mental illness" (SNS 24, 2022, para. 1). Without decent mental health care, problems such as anxiety, stress, depression and others can escalate due to shifts in the social context in which we live. Aligned with the theme of the project, it is widely accepted that some individuals, when confronted with certain situations such their transition to higher education or certain challenges experienced during their academic life, may develop some mental disorders that worsen or contribute to a decline in their mental health. This often happens because, according to authors Lúcio, Medeiros, Barros, Ferreira and Rivera (2019), "the transition to academic life is characterised by expectations and changes that require adaptations to a new reality, and have a profound impact on the personal, cognitive, professional, affective and social development of students" (p. 263).

1.1.1 The impact of Covid-19 on mental health

With the emergence of Covid-19, mental health worsened. The pandemic has given rise of various concerns related to adaptation, social interaction, motivation, and hygiene and safety in institutions that brought about the fear of a potential contagion and triggered psychological problems stemming from the uncertainty and insecurity of returning to school and coping with the workload experienced during lockdown (Morales & Lopez, 2020).
Covid-19 has disrupted our social interaction patterns and our way of life. In an interview about Covid-19, Professor Maria José Núncio stated that, with the pandemic, coexistence, previously seen as a factor capable of providing balance to our lives and generating well-being and belonging, is now regarded as a potential danger (ISCSP, 2021).
According to the study "Economic, social and political impacts of Covid-19 in Portugal" conducted by the Francisco Manuel Foundation, the group most affected by this pandemic was composed of young people between the ages of 15 and 20. This specific group was indirectly affected as they became less active, and experienced profound changes in their sleep patterns due to alterations in school schedules and disruptions to their habitual life cycles (Neves, 2021).

1.1.2. Depression among young university students

University students are in a stage of heightened vulnerability. They are repeatedly confronted with different stress factors that can impact their mental health, often leaving them feeling on the verge of breaking down. Among the factors that contribute to increased stress and anxiety, the following can be highlighted: leaving their parents' home, with all the associated implications; the expectations they form regarding their future, which they don't always achieve; and the adaption to adulthood, among others (Silveira et al., 2011).
From this point of view, the most common problems among young university students are related to anxiety, depression, substance addiction and personality disorders (Silveira et al., 2011).
Among mental health disorders, depression itself is regarded as a mental health condition that currently affects a significant percentage of the population. Mental health problems have significantly increased in recent years among university students, not only in terms of quantity, but also in terms of the severity of the cases reported (Silveira et al., 2011).
According to Silva (2020), a former higher education student, depression creates recurring instability and feelings of melancholy. According to Pereira (2009), depression affects a person's life across all levels and has serious personal and social consequences.
In addition to depression, students may develop disorders such as anxiety and stress. These disorders are caused by fear, apprehension and discomfort when anticipating the unknown, as in the case of anxiety. Students may also experience stress because they now live in an environment in which they are expected to take responsibility for their learning and preparation for their professional future. These more visible disorders often negatively affect academic performance.
Anxiety is a vague and unpleasant emotional state induced by fear, pressure or discomfort about the unknown and causes feelings of nervousness and panic. Stress, on the other hand, is a physiological reaction to experiences or situations that pose threats to well-being and can lead to moments marked by both instability and stability (Lúcio et al., 2019).
Consequently, university students show high rates of depression, anxiety and stress, aspects that make them less able to cope with the academic and social demands of university life, resulting in depressive episodes and anxiety crises among the most vulnerable of them, and have a negative impact on their lives, interpersonal relationships, performance and behaviour (Nogueira, 2017).
People suffering from depression commonly experience suffering, anguish, low self-esteem, and a lack of interest in what they do. The depressive state causes imbalance, frustration, demotivation and a lack of ambition resulting in a sense darkness (Pereira, 2009; Mann, n.d.). According to the World Health Organisation (WHO), depression is considered the "Evil of the Century" (TJDFT, 2019, para. 1).
There are many other symptoms of depression beyond those already mentioned that can open the door to other illnesses, such as cardiovascular disease. Depression also brings about changes in the brain, as it may affects neurotransmitters (serotonin, norepinephrine and dopamine), which transmit nerve impulses to cells (TJDFT, 2019). However, depression is currently recognised as an illness like any other. Depression is not synonymous with madness, laziness or irresponsibility (Medicare, 2020).

1.2. Art Therapy

In a context marked by mental health issues, including depression, anxiety and stress among young higher education students, art can help them find balance and recharge energies. They can, therefore, turn to Art Therapy to express their emotions, restore energy, achieve equilibrium and invigorate self-acceptance as individuals (Pereira, 2009).
According to Pereira (2009), Art Therapy is essential for the treatment of depression, which is mainly characterised by causing mental confusion and lowering the individual's vital mood, making them less efficient at work and keeping them away from social interaction (Pereira, 2009). Art Therapy involves different fields of knowledge and aims to rescue the human being and their wholeness relying on processes of self-awareness and transformation, using aesthetic and artistic creation in support of mental health (Coqueiro et al., 2010) in order to facilitate communication, meaningful emotional expression and self-awareness (Arte-Terapia, n.d.).
Art allows people to "materialise thought, clarify ideas and, above all, serves as a means of communication" (Lino, 2020, para. 4), hence becoming a "tool for promoting and treating mental health" (Lino, 2020, para. 4). This practice is known as Art Therapy.
It consists of a method of psychological treatment that utilises artistic means in a therapeutic context to facilitate communication, meaningful emotional expression and self-awareness (Arte-Terapia, n.d.).
The primary objective of the Art and Mind project is to achieve freedom in conveying thoughts and emotions through the use of the body (in this case hands and feet), which can result in specific drawings or abstract art. In this sense, Art Therapy, as a technique, involves both the fields of art and psychology. It enables individuals to transform a thought into a real and tangible image through different therapeutic practices, contributing to the individual's personal development (Loiola & Andriola, 2017).
According to Jung (2008), our senses respond to real phenomena, such as visual and auditory sensations that are then transferred

to the realm of the mind, where there are unconscious aspects, unknown to us. In the unconscious, there is an abundance of thoughts, images and impressions that, while remaining hidden, largely influence our conscious mind (Jung, 2008).
In this context, cultural symbols emerge as a means of revealing so-called "eternal" truths, since they invoke deep emotional reactions. The expression of this psychic charge, through the creation of cultural symbols, becomes a vast area of exploration and object of study for psychologists (Jung, 2008). That way, the arts emerge as a means to unveil something that is not visible, to promote the recovery and maintenance of mental health.
However, this promotion arises due to the ability of art to change the way human beings feel about the world and themselves, making it a way to reach deep emotions and becoming an instrument for individuals' subjective revelations (Almeida, 2018), some sort of self-help process.
Bearing all this in mind, we have to highlight two authors/artists whose work can serve as examples of Art Therapy expression: Jackson Pollock and Yves Klein.
In the first case, the artist based his work on the transmission of his own emotions or sensations through representations made with drips of paint, without a specific direction, using the technique known as Action Painting. To achieve this, Pollock resorted to spontaneous action connected to his human essence, where he innovatively interpreted emotions, spirituality and vital energies. In his artworks, Pollock shows an artistic process based on his creative instincts, where he dances across the canvas in a trance-like state, with a present logic, avoiding the creation of distinctive shapes in the drippings of paint (Martins, 2021).
Pollock's works reveal a direct connection between his feelings and the art piece itself, due to the existence of a balanced interplay between calmness and aggressiveness in his work, which stems from his unconscious mind, as he perceives himself within the artworks, as if he were a part of them (O'Connor, 2022).
In the second case, the artist creates his paintings using only a single colour and living brushes (his body). He focuses on the creation of conceptual art, where his art piece is the visible or invisible idea behind a finished art object that is intended to provoke questions or critiques. (P55.ART, 2022).
With his work, Klein embarks on a search for the spirituality of the immaterial through pure colour, blue in this case, and the use of anthropometry, using the paint-covered bodies of models as his brushes, creating a certain gestural written language (Museo Nacional Centro de Arte Reina Sofia, n.d.).
However, this anthropometry serves as a stabilisation of the colour through the body marks that appear as a result of the pressure of the bodies against the canvas. Afterwards, only the colour remains (Gigatos, 2022).
Yves Klein didn't stop at static anthropometry, he also created dynamic anthropometries. In these dynamic anthropometries, the model's body remains impressed on the canvas, but she also crawls or slides across the support adding dynamism to the work. This dynamism resembles a kind of ritual, where Klein himself claimed that the flesh applied the colour to the support, but then moved on to the invisible, giving the anthropometries the role of "transition from the visible to the invisible, from the material to the spiritual and from the carnal to the divine" (Gigatos, 2022, para. 61), without the artist's presence.

2. Descriptive memory

The purpose of this descriptive memory is to document the different phases of an artistic intervention project developed with students at the ESEV as part of the Art and Mind artistic intervention. The description of this intervention combines the point of view of each author on the same theme, in accordance with the problem-solving method.
Assuming that the mental health problem among young university students has worsened in recent times, there is a pressing need to understand what can be done to improve this situation. To address this, we formulated the following question: "How can Art Therapy help university students improve their mental health condition?"
In an attempt to answer this question, the research focused on "Art and Mind". The methodology employed in our research work included a literature review and, at the same time, a collection of photographic images related to the subject was carried out. In this context, different ideas for the implementation of our artistic intervention, upon which this descriptive memory relies, began to emerge.

2.1. Creative proposals

After a brief brainstorming session, we decided to create an outdoor exhibition featuring three panels, each serving a different objective.
We decided to add another panel to our initial project. This new panel would be used by students to share thoughts and ideas about how they feel regarding their mental health using text and images.
As for the other panels, each would have its own characteristics. In the first panel, participants would draw their current mental state, using only their feet. All the students who took part in the execution of this panel would have to wear disposable shoes.
In a second panel, participants could express their emotions using their hands, covered with disposable gloves. After these initial interventions, the participants were expected to stick their disposable gloves and shoes on a third panel, displayed above the others, to create another visual composition. The participants were expected to leave traces of their participation on this third panel to create a joint representation of mental health.
The four panels created during the artistic intervention were designed to be displayed, side by side, vertically, in sequential order to be contemplated by the school community. In this way, the students who took part in the creation of this project would see the outcome of the artistic intervention they were part of and realise that they had too, in some way, contributed to raising awareness of young university students about mental health issues.

2.2. Experimentation

During the materials experimentation phase, we conducted several experiments with the materials required for the artistic intervention to test them and understand if they could be used in the final product.

2.2.1. Experiments carried out by Inês Queirós

To carry out the project's experiments, the author used A4 sheets for the part where she had to use her hands and A3 sheets for the part where she had to use her feet.
As seen in the images below, and since there was no disposable shoes available, Inês chose to use disposable gloves adapted for the experiment. She carried out two experiments, one using only primary colours and another using the same colours with the addition of black.
In these experiments, her aim was not to create specific, defined drawings, but simply press her paint-covered hands and feet on the paper and leave a three-colour

impression (yellow, cyan blue and magenta) overlapped with a few dragging effects, achieved by simply moving the gloves on the paper.

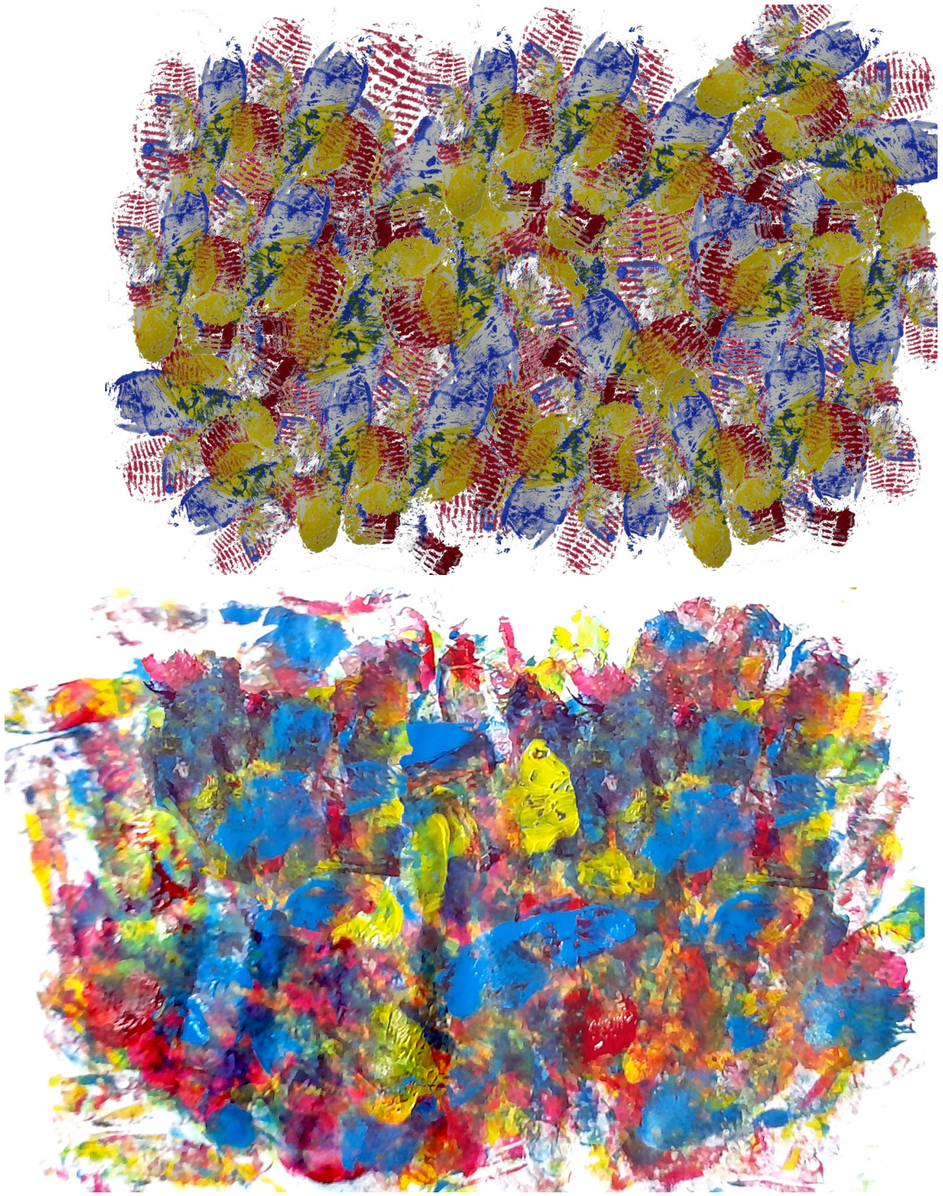

Fig. 1 e 2 Panels

2.2.2. Experiments carried out by Rita Paz

To understand how the elements would work together, the author conducted various experiments with the materials to be used during the collective creativity moment. These materials included latex gloves, disposable shoes, A3 Bristol paper and acrylic paints. During the experiment where she used her feet, the author utilised two different types of footwear. The results obtained during the artistic intervention were described by the author as curious and unexpected.

opinions, we decided to divide some tasks. Rita Paz was responsible for acquiring the wooden panels and the paints, while Inês Queirós was responsible for finding the latex gloves and the plastic sheets for the

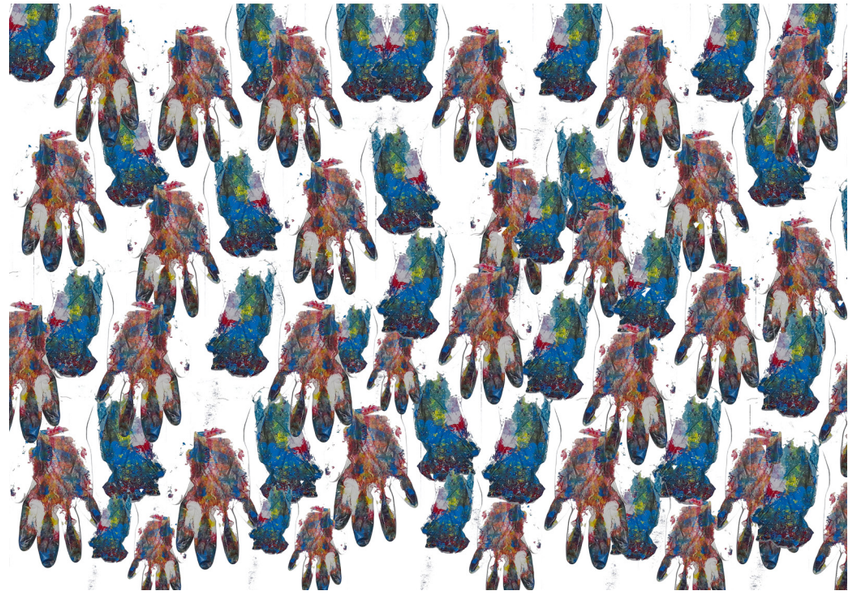

Fig. 3 Panel

2.3. Implementation

Following these experiences, we began to consider how to obtain the material we needed to carry out our project. After hearing some suggestions and

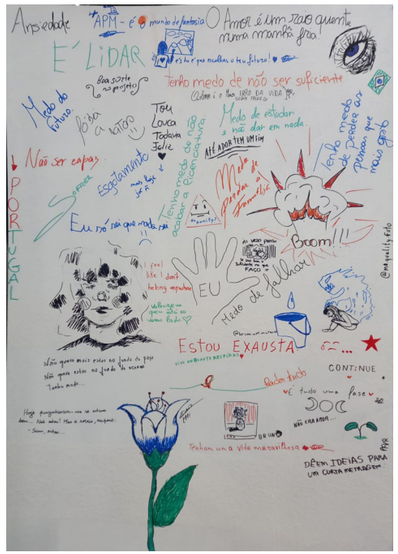

Fig. 4 Evolution of the sharing/collaboration process

lining. Meanwhile, to improve the project, a fourth panel was added, where the project's theme would also be addressed, and require the participation of the public. With this addition, more materials were needed, such as a white wooden panel, which ended up being Rita Paz's responsibility, and marker pens and preparatory text that would be provided by both of them.

In the meantime, the group decided to divide the project into two parts: one of them would be a physical representation while the other would be a digital simulation of the project, given the quantity of materials required.

2.4. Testing and/or simulation and evaluation

In order to test the acceptance of the artistic intervention by the target audience - university students - the panel on which students were asked to share their thoughts and ideas was displayed at the ESEV for a few days (November 23, 24, 25 and 26).

The space chosen for placing the blank panel was a common school area. It was positioned vertically next to the exit door. This location was selected because it is a busy place with a constant flow of students coming and going. We also placed an informative poster identifying the project and explaining its objectives. In addition, a box of red, green, blue and black marker pens was left next to the panel. Figure 4 shows the evolution of the collaboration process.

3. Final product

The simulation of the public presentation of the artistic intervention outcomes was designed to take place in an indoor space at the ESEV, specifically in one of the corridors next to a common school area. The first three panels, placed horizontally at eye level, show the works of art created by the participants of the intervention using their feet and hands to express themselves. In the centre panel we can witness the traces used in the creation of the works.

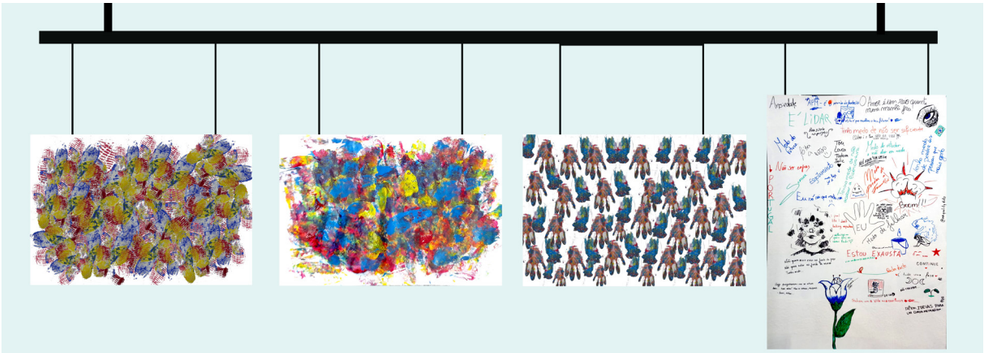

Fig. 5 Final Product

The work displayed vertically includes the drawings, images and words expressed by the students about their current mental health status as higher education students.

Conclusions

This article, related to an artistic intervention project, allowed us to investigate and reflect on how Art Therapy can contribute to improving the mental health of university students. In this context, Art Therapy emerges as a means through which university students can release their emotions to feel better about themselves and to improve their interpersonal relationships with society.

Through the implementation of one part of the art project (the vertical project panel) carried out by our university students, it became quite evident that there are students at the school who show signs of stress and anxiety, since many of them left messages describing their fears and insecurities.

The messages left on the panel show that the most prevalent/ expressed feeling among students was fear, especially the fear of not being capable of accomplishing the things that people expect from them, the fear of losing someone or the fear of failing. However, some of the messages scattered across the panel also show that there are students who accept what they feel and try to live positively.

We can therefore affirm that the objectives initially set for the project were achieved, in that it helped confirm our perception of the students' mental health status. Despite the final product being only a simulation, we realised that, in the future, the execution of the project will enable us to contribute to the well-being of the students, by promoting a thorough reflection on the issue.

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A portrait of domestic violence through art

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Abstract
The primary objective of the Grades project is to understand how art-based educational research can effectively address the issue of domestic violence through artistic expression. This project is part of the A/R/T exhibition and was developed as part of the Artistic Observation and Intervention Methodology course, within the scope of the Master's degree programme in Teaching of Visual and Technological Education in Basic Schooling. Since this Master's programme qualifies individuals for teaching children, we deemed it pertinent to study this subject, because, as future teachers, we must be vigilant and prepared to intervene appropriately. In our initial approach, we conducted a literature review on the nature of domestic violence, exploring its consequences for women and children who are victims of such violence, and examining how art can contribute to raise awareness against domestic abuse. We also conducted research on artists who explore the theme of domestic violence in their artworks. Finally, we implemented the Grades project. We believe that addressing this issue requires public action that extends beyond the political sphere and should involve the artistic realm. Art can play a significant role in shaping a more informed understanding of this social reality and serve as a powerful tool for societal transformation.

Keywords: Domestic violence; Art; Art-based education.

Introduction
The data collected through the Portuguese Association for Victim Support (APAV) on domestic violence indicates a concerning increase in cases of domestic abuse. This scourge, which many believed to be a relic of a long-forgotten past, is regrettably on the rise for a wide range of reasons. Countless artists are currently producing artworks that confront the issue of domestic violence, which proves that art can be a powerful means of raising societal awareness about this pressing concern.
The Grades project aims to understand how art-based educational research can effectively address the issue of domestic violence, using art as a mean of expression. This initiative is part of the A/R/T exhibition, developed as part of the Artistic Observation and Intervention Methodology course unit of the Master's degree programme in Teaching of Visual and Technological Education in Basic Schooling.
This research project, titled "A portrait of domestic violence through art", aims to address the question: "How can art contribute to raise awareness against domestic violence?".
To address the question, the study began by establishing a clear definition of the term “domestic violence”. Subsequently, it highlighted the work of some artists who use art to tackle domestic violence, delved into the psychological consequences for women who fall victims to domestic violence, and explored the impact of domestic abuse on children’s development.
We believe that this approach is relevant, since it is part of the work developed within the Master's Degree in Teaching of Visual and Technological Education in Basic Schooling, which qualifies teachers to work with students aged between 10 and 12 years. For this reason, it was imperative for us to explore the subject, considering not only domestic violence against women but also its impact on children. This analysis holds particular significance due to the perceived effects of domestic abuse on the behaviour of children who live in environments impacted by domestic violence, or of those who are direct victims of that sort of abuse.
The purpose of this study is not merely to define the term “domestic violence” but also to develop the Grades project, which is anchored in specific premises and characteristics associated with the subject.

1. Definition of the term “domestic violence"
Lourenço and Carvalho (2001) define the term violence "as a transgression of the systems of norms and values that refer, at each socially and historically defined moment, to the integrity of the person" (p.98). This idea is supported by Madalena Duarte (2019), the coordinator of the project “Prevenção e combate à violência contra as mulheres e à violência doméstica nas entidades empregadoras: Guião de boas práticas” (Preventing and combating violence against women and domestic violence in Employment Entities: A guide to good practice), who emphasises that domestic violence:

> generally involves any action or omission between individuals living in the same domestic space or, if not cohabiting, are ex-spouses, ex-partners, parents of common offspring, ancestors or descendant. It usually encompasses maltreatment and physical, moral, emotional, sexual, psychological and/or economic harm” (p.14).

According to APAV (2012), domestic violence refers to harmful behaviours perpetrated within a relationship by one of the parties. It exists as a form of control exerted by that party over the other. The WHO Global Consultation on Violence and Health (1996, cited by World Health Organisation, 2014, p.2) defines violence as:

> the intentional use of physical force or power, threatened or actual, against oneself, another person, or a group or a community, that either results in, or has a high likelihood of resulting, in injury, death, psychological harm, poor development or deprivation.

Domestic violence is a reality that can affect individuals of any gender, irrespective of age, religion, culture, ethnic group, sexual orientation, educational background, or marital status.
Panmela Castro is a Brazilian artist whose graffiti art addresses topics related to domestic violence, gender equality, and women's rights. The artist also engages herself in performances that question the role of women in society. On her website[1], Panmela Castro states that "The common thread in all my production is the exploration of ideas drawn from my experiences and interactions with others, as well as from my work as a social activist". Castro draws inspiration from her own experiences, having been a victim of domestic violence herself. Her artistic compositions incorporate slogans and representations of the female figure. In her latest exhibition "Retratos relatos" held in Rio de Janeiro, Brazil, she presented nine paintings, each accompanied by the stories of the people depicted. Additionally, three other objects were incorporated into the exhibition.
Another artist tackling domestic violence in his works is Alexsandro Palombo. Born in 1973 in Italy, Alexsandro attended the Marangoni Institute, a renowned school of fashion and design in Milan. He is a contemporary pop artist, activist, fashion designer and illustrator. He is known for his colourful, reflective and irreverent works that depict pop culture, fashion, society, diversity, ethics and human rights.
This Italian artist distributed portraits of well-known women from the world of politics on the streets of Milan. He recreated these portraits by adding bruise-like elements onto the original photographs. The personalities are shown disfigured by different types of facial injuries. These posters appeared on the streets as part of an impactful campaign that used photomontage to address violence against women.
The portraits feature the phrase “Just because I am a Woman”, in English.
According to the DW Brasil website (2020), Palombo, in his own words, "wanted to illustrate the drama that affects millions of women worldwide, to condemn it, raise awareness, and obtain a tangible response from institutions and politicians.
Beneath the images of the wounded faces, each poster displays phrases that depict the experiences of several women who have fallen victims to violence: "I am a victim of domestic violence, I get paid less, I have experienced genital mutilation, I do not have the right to dress as I want, I can't decide whom I´m going to marry, I was raped."
These artists serve as compelling examples of how, through art, it is possible to denounce and raise awareness about a critical issue like domestic violence.

1.1. Psychological consequences for women

In this context, it can be said that domestic violence inflicts not only physical but also psychological distress. Santos (2018) asserts that persistent exposure to domestic violence can cause the victim to suffer from "low self-esteem, depression, anxiety and suicidal thoughts" (p.9). Women who endure persistent domestic violence frequently exhibit cognitive and memory disorders, such as concentration issues, that hinder decision-making and lead to depressive behaviours, namely: shame, isolation, self-blame, low self-esteem, followed by anxiety disorders (fear and panic attacks) (Matos, 2003, cit. by Santos, 2018).
The 2021 annual report from the Portuguese Association for Victim Support indicates a 78% increase in domestic violence cases between 2016 and 2021. Within this percentage, 6.8% per cent of women who suffer from domestic violence have a higher education degree, 5.8% have completed secondary education and 5.4% have completed the Portuguese 3rd cycle, equivalent to English Middle School. These figures may suggest that women with higher educational qualifications have greater knowledge and more information, and therefore report situations of abuse more frequently. However, these figures may not fully capture the true extent of domestic violence. In other words, women with lower educational qualifications and less awareness of their rights may be less likely to report the abusive situation they endure. Another reason why women do not report may be linked to the cyclical nature of domestic violence.
Born in Maputo, in 1968, and currently living in Portugal, in the district of Vila Real, Jorge Marinho is an artist who has grounded his work in environmental, social and political issues. For his creations, he employs different materials such as wood, pigments, glues, canvases, acrylic paints, etc. As an artist, he has garnered several awards for his painting and has participated individually and with other artists in national and international exhibitions. In his recent exhibition titled "Paredes de estuque" (Plaster Walls) displayed at the Casa da Granja, in the municipality of Amarante, the artist addresses domestic violence experienced within the confines of the family, behind closed doors.

1.2. Domestic violence and its repercussions on children’s development

According to Kitzmann (2007,) children who witness domestic violence may react in diverse ways. They may intervene, isolate themselves, or become more aggressive. These children are susceptible to various psychological, emotional, behavioural, social and academic problems. Even if they are not directly subjected to physical aggression, these children are at risk, since they may still experience various psychosocial issues.
According to the same author, even in the absence of direct aggression, children exposed to domestic abuse may develop problems similar to those observed in children who have experienced direct physical abuse. This clearly shows that any form of violence within the family can significantly impact a child's development.
Prata and Santos (2007, as cited by Reis, 2018) mention that a good relationship among family members contributes to the positive mental health of all its members. Consequently, harmony and the quality of family and marital relationships have a direct and positive influence on the development of a child. Given the pivotal role played by family in the transmission of values, it is reasonable to assume that a family scarred by domestic violence can be responsible for deficits and disorders that will affect the psycho-affective growth of a child. Dias (2013) reports some of the short-term consequences observed in children who are victims of family violence. These consequences include repetitive nightmares, anger, guilt, shame, fear, acute phobic-anxiety, depressive symptoms, psychosomatic complaints, social isolation,

1 https://www.panmelacastro.com

and feelings of stigmatisation. The author further notes that subsequent damage may also occur, including anxiety, fear, depression, isolation, anger, hostility and guilt, along with problems related to the perception of danger, and confusion. This can cause difficulty in understanding complex roles and managing interpersonal relationships.

Therefore, to assist these children, it is imperative to first identify and subsequently report cases of domestic abuse in which they are involved. This requires a collaborative effort that involves various professionals, with teachers playing a fundamental role.

Adonay is a 37-year-old artist who uses street art to portray children who are victims of abuse. According to the Uol Brasil website (2022), which paraphrases the artist's words about his work, "Drawing society's attention to awareness and discuss the subject is of utmost importance, and art, essentially painting, stands as an essential communication tool." In his exhibition called "365 dias de proteção: um olhar para os direitos infantojuvenis e suas violações [2]" (365 days of protection: a look at children's and young people's rights and their violations), the artist portrays two children. One of them is depicted as free and happy, playing with soap bubbles, while the other is restrained, silenced by a hand that symbolises the deprivation of her right to speak and to freedom. The bruises on her face indicate that she is a victim of violence. The phrase "a criança só quer ser criança (the child just wants to be a child) emerges from the soap bubble created by the toy held by the happy and playing child, stressing what should be an inalienable right of children: the right for children to simply be children without ever experiencing violence.

2. Descriptive memory of the Grades art project

In the words of Costa (2020), a/r/tography or Art-Based Educational Research (ABER), represents the recognition of Art-Based Research as an emerging and expanding field of research and investigation within the Social Sciences and Humanities.

According to the aforementioned author, a/r/tography is a research area within the arts that explores the relationship between being an artist/educator/researcher. These traditionally distinct roles were brought together by the work of Rita Irwin.

Research is a process for the construction of knowledge applicable to any individual, regardless of their profession. However, the role of a teacher becomes particularly relevant as they are constantly interacting with individuals of different thoughts, attitudes, and needs. Art-based educational research establishes that the researcher, the teacher, and the artist are the same person (Irwin, 2008, 2013 cit. by Charréu, 2019).

According to Alves (2015), a/r/tography is a methodology that seeks to understand educational processes in a more intricate manner by acknowledging the possibility that an individual can simultaneously be an educator, a researcher, and an artist, and master all the distinct characteristics and processes inherent to each of these roles.

This line of thought aligns with the Grades project, a component of the A/R/T exhibition developed in the Artistic Observation and Intervention Methodology course of the Master's Degree in Teaching of Visual and Technological Education in Basic Schooling, which is designed to qualify individuals for teaching practice with students aged between 10 and 12 years old.

It was deemed pertinent to study the subject not only within the context of domestic violence against women but also in relation to children. Specifically, the objective was to analyse the impact that living in environments marked by domestic abuse and directly experiencing such violence may have on children's behaviour.

For this research project, following the selection of the topic, a search for artistic references and authors who have addressed the studied issue through art was undertaken. Several authors, whose artwork centres on the subject, were identified. Panmela Castro, Alexsandro Palombo, Jorge Marinho, and Tatsuya Tanaka were some of those notable figures.

To successfully implement a project that would directly involve the public in order to raise awareness about this issue, and recognising that art can serve as a powerful vehicle to achieve such goal, we conceived an intervention that addresses the topic of domestic violence through art. The initial idea drew inspiration from the works of Japanese artist Tanaka Tatsuya. The concept involved the creation of a small installation in which an act of domestic violence was simulated using micro characters. The backdrop would be made of package leaflets and boxes of antidepressant medication, as depression is frequently associated with this type of violence. In line with this context, a model inspired by this idea was constructed, as depicted in figure 1.

The initial project included the representation of a couple. The man assumed a more aggressive posture, while the woman was seated, her hand on her chest, and her head slightly tilted. Her entire body language was a reflection of her despair. However, we felt that the characters were too small, and as a result, the final result did not achieve the expected impact. Consequently, we had to look for an alternative solution.

Some new ideas were discussed and, as a consequence, the decision was made to go for something on a larger scale that could be widely publicised to raise awareness about this issue. This gave rise to a new concept and to the development of the following project: since a relationship is supposed to be built on love, friendship, companionship, respect, sharing and care, the new idea was to portray a set of bars, similar to those found in Aveiro, on the "Ponte dos Namorados/Laços de amizade". (Valentine's Bridge/ Friendship Ties). On this bridge, where padlocks were once left (a practice that was discontinued to prevent damage to the bridge), ribbons carrying messages of love are now tied to the bridge's wooden railings as a symbol of love and friendship. To create the Grades project, the plan was to construct the foundational structure of the work in iron, simulating prison bars. This was done to evoke the lives of women and children who endure confinement and abuse, living subjected to acts of violence. Ribbons bearing messages alluding to the theme of domestic violence would be tied to these bars. These elements serve to create a contradiction between the

Fig 1. Model/Study for the initial idea

messages of love and friendship displayed on the aforementioned bridge, and on other bridges/grates/sculptures around the world,

2 https://cultura.uol.com.br/cenarium/2022/06/22/196646_violencia-contra-criancas-e-adolescentes-e-retratada-em-exposicao-artistica-projeto-traz-obras-visuais-de-artistas-amazonenses.html

where locks and ribbons symbolising love are visible.
For this project, some small-scale railings were developed, but the aim was to create an installation with larger railings that would

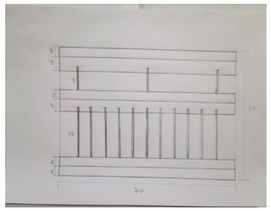

Fig 2. Sketch of the railings

be displayed in an outdoor area, allowing greater interaction with the public. The construction process began with the creation of a sketch, as shown in figure 2.
The construction of the railings involved the use of iron, a ruler, marker pens, a welding mask, iron welding electrodes, a welding

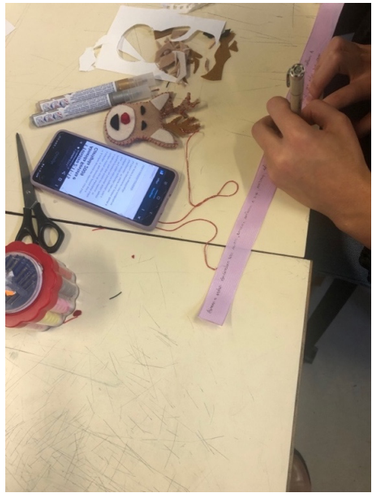

Fig 3 e 4. Inscriptions on the ribbons

machine, an iron cutting machine, and grey paint spray.
The second-year class of the Master's programme in Teaching of Visual and Technological Education in Basic Schooling played a crucial role in the execution the project. During the implementation of this participatory artwork project, the concept we wanted to develop was explained to all our classmates, and they were subsequently invited to write a sentence about the theme using the ribbons provided.
Lilac was chosen as the colour for the ribbons, as it is commonly associated with campaigns against violence towards women. "Control, coercion, blackmail and violence are not synonyms for love"; "She really had it coming"; "It takes courage to be a woman in this world" (Samuel Johansen); "Every time there is violence against women, we get involved"; "Man acts and woman appears" (John Berger, 1972); "Violence destroys what it aims to defend: the dignity of life" ; "A woman's true power lies in her ability to be who she really is" ; "Women learn in silence, in complete submission"; "But I suffer not a woman to teach, nor to usurp authority over the man, but to be in silence" (Timothy, Bible); and "A woman brought you into this world, so you have no right to disrespect any of them" are some of the sentences created by students.

The final project culminated in an installation that can be placed anywhere for a certain period of time, allowing people to interact with the work. The completed project consists of a railing measuring 70 cm in length and 30 cm in height, made of iron and later painted in metallic grey, as shown in figure 7.

Fig 5. Railing featuring the ribbons tied by the participants

Fig 6. Placement of the ribbons

Conclusion

In the current context, the issue under study is frequently discussed; however, these discussions have not proven sufficient to put an end to this scourge. It is , therefore, essential to persist in raising awareness, and this is why we believe in the significance of the project.

To show the urgency of tackling domestic violence, Leite (2022) asserts, in an interview with the Semanário de Felgueiras, that, within this year alone, 22 women have lost their lives to domestic abuse.

This study made it clear that art can be an excellent means of dissemination and raise awareness about this issue. Art can make a fundamental contribution to address various social concerns such as poverty, violence, or pollution, among many others. Its purpose lies in drawing attention to perceived injustices in order to raise awareness and sensitise society to these critical issues.

In our original plan for the project, we envisioned the inclusion of authentic testimonies collected from women who had experienced domestic violence. Their statements would also be tied to the railings. Unfortunately, due to the time it took to complete the project, it wasn't possible to proceed with the idea. As an alternative, we included the participation of our fellow classmates. Given the tight time constraints we had to face, our future plans involve the implementation of a large-scale installation within a school setting. This project will allow us to collect authentic testimonies from the entire educational community.

Fig 7. Final project

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Sorority

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Abstract
The purpose of this chapter is to explore how virtual environments can serve as a means to develop educational artistic activities. In this case, our objective was to develop an installation within a virtual environment and assess whether it can be used as a tool for carrying out protest actions. To this end, we chose to centre our chapter on the concept of "sorority", which represents the unity among women in life, conflict and achievements. These connections among women can become a strong bond, proving valuable when common goals are at stake, particularly in their constant and daily struggle against societal norms, stereotypes and gender-related issues. This article will discuss information gathered through bibliographical research, analyse different documentaries and films, and examine images, installations, and works created within virtual environments. The information collected from relevant studies addressing these topics will serve as the foundation for an installation developed within Craft World.
The installation aimed to represent unity and sisterhood among women and their collective strength in the feminist struggle represented through the use of female bodies and braids that symbolise elements of connection and protest. The importance of the study lies in this precise idea that unity is essential and must be sustained, as seen in previous moments (waves) of the feminist movement, to prevent any sort of stagnation or regression in women's rights. The entire work, from the literature review to the collection of examples used to execute the installation, is the starting point for the development of this chapter. The objective is to create a unique document that brings together the ideas developed individually by each group member. Reflecting on the process, it is pertinent to highlight the potential of virtual environments, as they offer the opportunity to create artistic spaces that prompt questioning, provide support for different causes, and facilitate the realisation of projects without depending on budgetary constraints or restrictions often associated with the use of physical materials.

Keywords: Sorority, Feminism, Female body, Unity, Virtual environment.

Introduction
Unity among women, often referred to as sorority, has been built over the years in response to the injustices and disproportionate treatment faced by women in society. This was the theme selected for the development of this work, driven by the realisation that achievements are neither permanent nor guaranteed. Women's struggle has been marked by highs and lows; for example, on June 24th, 2022, in the United States of America, the right to abortion was revoked. This represents a recent and alarming setback compared to the law passed on January 22nd, 1973 and renewed in 1992. This occurrence is just a small example of the different setbacks that have encouraged us to find ways to defend and secure rights and to protest when faced with injustice. This also stresses the importance of exploring the potential of virtual environments as a means of protesting, conveying a message, making an intervention, or creating an installation.
This chapter brings together the information gathered, describes the creative proposals inherent to the project, and provides a detailed account of the work process. To conduct the research, a documentary research methodology was adopted. This methodology involved the analysis of theses, dissertations, conference proceedings, reports, documentaries, and films. Various projects, installations, and works created within the virtual environment were also analysed. This work was conducted as part of the Artistic Observation and Intervention Methodology course subject, an integral component of the Master's Degree in Teaching of Visual and Technological Education in Basic Schooling
The chapter is primarily organised around feminism, seeking to understand the diverse initiatives that have been developed to support feminism, the current situation, and its historical context. Subsequently, a demonstration and detailed explanation of the work carried out in the virtual environment is presented. This explanation will be followed by a detailed description of the final product that includes references to the intentions of the authors of the installation. Finally, the chapter is succinctly concluded, summarising the problem initially proposed and its subsequent resolution, while addressing the key aspects discussed throughout the text. This structure allowed for an organised and cohesive approach that encompassed a comprehensive analysis of feminist actions and virtual artistic intervention, as well as the achieved results.
This chapter also aims to explore the potential of the virtual environment as a form of surrealist expression. Our primary goal was to create structures, environments, and objects that transcend the constraints existing in reality and that are often associated with the use of materials and equipment, the time required for the execution of large-scale structures, and the costs they entail. Additionally, virtual environments have proven to be a promising educational resource, as their utilisation stimulates creativity. Its contemporary, innovative, and captivating nature holds great relevance, particularly for young individuals who are currently attending basic education and spend much of their time immersed in the virtual world.

1. Framework
This section systematises the information collected on the four waves of feminism,

the concept of sorority, and the different areas that address these issues. Research was conducted to understand the evolution of women's rights achievements up to the present day. In addition, efforts were made to present methods that will show understanding and empathy for those who may be sceptical or afraid of being labelled as feminists. An extensive list of films addressing feminism, the importance of unity among women, and what it means to stand by a gender traditionally considered less capable was also provided.

1.1. The waves of feminism

This section will start by clarifying the concept of waves. Waves represent distinct periods in the history of feminism that stand out for advocating similar rights at different times. However, it is worth noting that 'waves' are not very precise periods, as we can see in the following quote from Molyneux et al (2021):

> A wave signifies fluidity and motion and is made up of multiple currents, each with its own momentum. For Rupp (1997), this makes feminism seem less like waves and more like 'choppy seas'. The international character of feminism further complicates periodization because waves are not neatly synchronized across borders. The time of social movements is not simple or unilinear. (p.4)

The current status of women's rights in Western society is substantially different from that witnessed in past periods. Throughout history, it has taken brave women to generate change, particularly in achieving the equality and rights enjoyed today. Faced with the need for women to protest in order to secure their present status, a movement emerged: feminism. Within this movement, four periods of time, referred to as waves, have stood out, each characterised by what they were standing against: the first wave, which prioritised the fight for political issues and rights in the workplace; the second wave, which advocated for the right to education, equal pay, the legalisation of divorce and abortion, among other issues; the third wave, which continues to fight against prejudice, racism, the victimisation of women, and sexist discrimination; and finally, the fourth wave, the most recent, which continues to defend everything that has been advocated so far, such as justice for women and the rejection of any kind of violence and sexual harassment perpetrated against women and against the entire LGBTQIAPN+ community, fighting to defend what has been achieved over time and which is constantly being challenged.

This 'choppy sea' is a struggle that began in 1848, led by Elizabeth Stanton and Lucretia Mott, and continues in 2023 with several brave women determined to conquer what remains to be conquered in terms of gender equality. Even today, this is a necessary struggle that is unlikely to end anytime soon, as we continue to live in a male-dominated and unsympathetic world.

In this ever-changing world, power is at times assumed by leaders who seem ill-equipped to handle events and therefore rely on what they know (prejudice, stereotypes, and outdated thoughts) when they have to make decisions.

The ancient Indo-European language, Latin, included feminine, masculine and neuter genders, but in its translation into Portuguese, the masculine was defined as neutral, as Simone de Beauvoir (1970) points out: "Man represents both the positive and the neutral, as is indicated by the common use of “men” to designate human beings in general" (p. 7). This shows that, since ancient times, men have perceived themselves as superior to women, since the Portuguese language emerged around two centuries before Christ. The ideal position would be to abandon gender-related stereotypes, as suggested by Dorothy Parker in “Modern Woman: a lost sex”: "My idea is that everyone, men and women, whatever we may be, should be considered human beings"

(quoted by Beauvoir, 1970, p. 8).

There are countless examples of gender discrimination. Take, for instance, the case of the artist Margaret Keane, who in the 1960s, fearing the challenges of a male-dominated society, chose not to fight back and accepted her fate: "Women weren't in business, and they didn't paint, they couldn't do all the things they do today - most of the time they just stayed home and looked after the children" (Taylor, 2017). Similarly, Chimamanda Ngozi Adichie (2013) argues that the problem with gender lies in the focus that privileges what women should be rather than recognising what they truly are (TEDxEuston), advocating the idea that, as women, we should question the conventions imposed by society.

The third wave of feminism emerged in 1990, building upon the accomplishments of the past waves and striving to carry them further. In this third wave, organised feminist groups began to emerge, featuring figures like Rebecca Walker, Jennifer Baumgardner and Amy Richards, authors of the book "Manifesta: Young Women, Feminism, and the future" (2000). These groups focus on various issues, as demonstrated by the Third Wave Foundation, whose aim is to "focus on gender, race, economics, disability, healing and transformative justice to achieve well-being, self-determination and liberation for all" (Third Wave Fund Staff, n.d.).

Finally, we would like to highlight an aspect that is somewhat related to this project: the use of the Internet within the context of feminist movements. Beginning with the third wave and extending into the fourth, and owing to technological developments, there has been a strong use of the Internet, particularly social networks, that soon became a platform used to expose problems and empower women to express themselves and be heard. In the fourth wave, which began around 2012, the goal was to draw attention to sexual abuse and sexist discrimination, and to create a supportive environment to ensure the conditions for sharing these stories without fear. In this wave, the fight also encompasses all groups included in the LGBTQIAPN+ acronym. Additionally, it advocates for equal pay, equal opportunities, and the primary objective of feminism: gender equality.

1.2. The concept of Sorority

In 1970, Kate Millett, a renowned writer, introduced the word sorority, a term that, despite its increasing usage, remains relatively unknown. The concept of sorority assumes a central role throughout this work, symbolising the unity among women in the struggles they have to face. According to Lamazales (2021), sorority is defined as a "sense of female solidarity and sisterhood used by women who participate in the feminist movement, and that implies unity, sisterhood bonds, respect, and the fight for gender equality" (p.17).

This relentless struggle and the need to repeatedly fight for equality and rights that are constantly being questioned are prompting many women to take actions that challenge the dignity and equal rights of women as a personal offence. This is exemplified by Gloria Allred (2018) who says that it is always personal for her when a woman is wronged or becomes the victim of something that can hurt her (“Gloria Allred - Justice for All” documentary). Sorority is not only associated with ethical, political, and practical dimensions but also with simple gestures of affection and care among women, such as braiding hair.

1.3. Cinematography and feminism

Throughout this work, an effort has been made to understand which means of communication has played a more significant role in drawing public attention to the subject of feminism. The impact of the world of cinema is unquestionable and in this work the following films are frequently referenced: "The Hidden Half" (2001) by Tahmineh Milani; "Big Eyes" (2015) by Tim Burton; "The Help" (2011) by Tate Taylor; "Little Women" (2019) by Greta Gerwig; "Pride and Prejudice" (2005) by Joe Wright; "I'm Not an Easy Man" (2018) by Éléonore Pourriat. All these films address, more or less directly, the female reality, advocating for awareness, the fight for equal rights, and the imperative of achieving gender equality. In addition to these films, the documentary "Gloria Allred - Justice for All" (2018) is also mentioned, as it explores the same topic. The analysis of these films allowed us to extract some crucial ideas to understand what perpetuates regressive and sexist thinking. Two of those films convey the notion that we are born free of prejudice: one tells the story of the artist Margaret Keane in the 1960s, who adopted her husband's surname as her artistic name. Initially she sold her paintings as if they were her husband's, giving up her author's rights. Influenced by societal norms, she ended up being exploited for her artistic talent, at a time when women's work was undervalued; the other film tells the story of a male child who, faced with the need to find someone to portray Snow White in a play, volunteers freely and without prejudice or discomfort to play the part. However, the audience responded to his performance with laughter and mockery. This shows that society shapes and influences those who are born free of prejudices. Another discernible aspect is the rivalry that exists among women, imposed by the society surrounding us, which compels women to conform to standards that everyone aspires to achieve, naturally generating competitiveness. Lamazales (2021) states that "a Patriarchal society has created women who perceive themselves as rivals, without questioning the reason for such enmity, and who surrender to sexism, internalising the habits imposed upon them" (p. 18). Nevertheless, these films also impart positive ideas. For instance, they highlight the strong support that binds women together in their fight against injustice, emphasising that sorority transcends skin colour, or the unity among women characterised by the provision of physical care, assistance, and acts of affection, such as combing each other's hair or helping the others get dressed. These films also stress the importance of psychological support, as women stick together and listen to each other. They also portray the assertiveness of women who refuse to limit their existence by respecting norms and conventions imposed by society, whether in education, culture, or marriage.

2. Descriptive memory

In this section, we will present the different phases of the work following the strategies laid down by the problem-solving method. The first stage of the work has already been

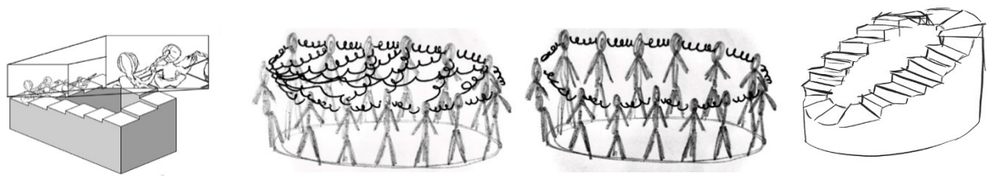

Fig 1, 2 e 3 Sketches

mentioned throughout the article. It provides a detailed analysis of the actions taken and highlights the logic and rationale behind each decision.

2.1. Creative proposals

The primary objective was to represent the unity and sorority among united women. To this end, braids were chosen to symbolise the strength conferred by unity, commonly associated with the feminist struggle. The choice of this element establishes a connection with its historical use as a form of protest. While it has become commonplace today, this element was once used to identify tribes, draw maps, and serve as many other forms of communication. Once this decision had been made, sketches were developed and aspects that could enhance the symbolism of the work were selected. Figures 1, 2 and 3 depict the sketches developed during the brainstorming process.

Curiously, the circular geometric shape appears in three of the sketches, each addressing the issue in different ways, yet converging towards the same goal: to represent unity. In one of the sketches, it is associated with the commonplace and mundane aspect of the circle that is typically used to convey a sense of cycle, constancy, and movement but it is also linked to the term "roundtable", a method used to democratically discuss topics or subjects in which all those involved have the right to express their opinions.

As the term implies, a roundtable involves arranging people in a circular fashion where no one is more important than the others, where everyone stands equal. Therefore, it became evident that this circular form should be included in the composition. It is worth noting that this representation of unity is often observed in paintings, such as Louis Janmot's "The Poem of the Soul", or in Saskia Boddeke's work created within the virtual world: "Mijn Naam Is Haas".

Another aspect of particular interest is the presence of stairs, reflecting the highs and lows that characterise the female struggle. It would make perfect sense for the stairs to serve as a metaphor for the ups and downs, achievements and defeats. In these sketches, we drew inspiration from the work of some renowned authors, such as Oscar Reutersvärd's "Penrose Stairs" (1937), whose influence is evident in the first sketch, or Olafur Eliasson's sculpture titled "Infinite Staircase" (2015). However, the intention was to keep this idea intertwined with that of the multiplicity of times, the indefinite, the constant conveyed by the circle. Sorority among women, and the possibility of this connection being infinite, symbolises the endless female struggle within society. At this stage, some important decisions were made concerning the development of the work we wanted to implement within the virtual environment, both in terms of formal and conceptual aspects. In addition to the considerations mentioned earlier, we decided that the female human figures would be naked to emphasise the notion that we are fighting to bring justice to all women, regardless of their community or age, that this fight is indifferent to religion, wealth, or social status, and that its sole aim is to secure rights and respect.

2.2. Experimentation

During this phase, several individual experiments were conducted, and, upon analysis, we decided that each attempt would make a worthwhile contribution to the project. The most relevant experiments

will be presented in chronological order. Initially, an exploration of the virtual environment was undertaken, focusing on the construction and manipulation of objects, changes in textures, and the use of other tools provided by the programme. Next, the MakeHuman application was installed, since the creation of human figures would be a crucial aspect in the development of the work. Female human figures were developed within the application, exploring different body types, skin colours, features, and poses.
Once the figures were completed, they were exported in a compatible format and subsequently imported into Firestorm. The process was then repeated to find the best way to incorporate these human figures, continually seeking potential improvements. It became evident that new skin textures had to be explored, since we wanted the installation to represent a diverse range of women, recognising that the challenges faced are common to all women worldwide. To fulfil this need, Adobe Photoshop was employed to create new skin textures. Subsequently, new poses for the figures were explored. Some were exported for later importation into the virtual environment and then the exploration and application of different skin tones could begin. In addition to variations in skin colour, different eye colours were also tested. Those different options were based on a photograph taken by one of the mentors of the project.
The implementation of the creative proposals previously envisioned and conceived for the installation was now ready to commence. As mentioned earlier, the aim was to arrange the figures around a circle and incorporate infinite staircases.

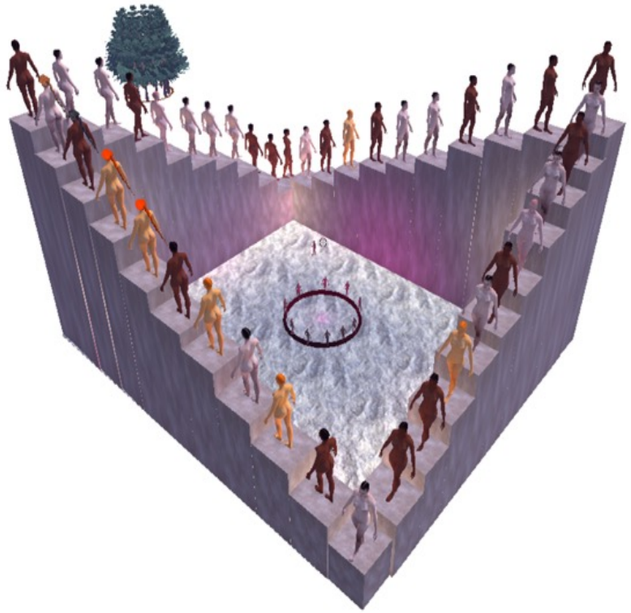

Fig 4 Completed Installation

2.3. Execution
In this phase, a meeting was held to decide the aspects that should be included in the final installation and to distribute the tasks among the participants. The human figures were developed by one of the authors of the project, since she was quite familiar with the MakeHuman application. Consequently, she was also responsible for developing the skin and eye textures. The aesthetics and lighting of the piece were entrusted to the other author. Both authors collaborated on the entire project, however one of them was responsible for the construction of the "outer wall" while the other was responsible for providing the interior of the "wall". Throughout the process, several issues were identified: in terms of configuration, the structure was excessively stretched on the ground, so the group had to explore textures, scales, offsets, and repetitions to achieve the necessary improvements; the "wall" lacked texture, so the appropriate textures had to be applied; the structure was not properly aligned, so the align tool was used to correct the issue; some of the human figures were hovering, so their positioning had to be adjusted; the assessment conducted revealed a lack of vitality, which was addressed by adding lighting using the light resources available in the application. Lighting was

Fig 5 Detail of the Installation

applied to the entire staircase and the circular element. These problems were successfully resolved, as can be observed in the images below (Figure 4 and Figure 5). The only thing left to explore was a solution to successfully picture the braids. A search began in virtual stores to find a pre-made option, but the wigs available were too complex, with too many prims[1] , i.e., too much weight, which made them difficult to use in the installation. Consequently, we kept searching for an alternative way to incorporate the braids. Eventually, an interesting solution was found: creating a cylinder and experimenting with the options offered by the programme: twist, revolution, profile cut, and altering the orientation, size, and rotation. Once the appropriate shape for the object was achieved, we looked for images of hair textures with Creative Commons licence and integrated them into the human figures.

2.4. Simulation and evaluation

As the installation matched the intentions initially set, a thorough analysis of the result was conducted. Even though the installation was not completely finished, it possesses unquestionable visual impact and the potential to metaphorically convey the intended message: women will never give up until they achieve gender equality. Although this was our first interaction with the Craft World platform, the result was deemed quite satisfactory. However, we are fully aware that there are details that can be improved.

3. Final product

The installation consists of a set of large-scale nude female bodies ascending and descending an infinite staircase, as depicted in figure 4. The size of the bodies symbolises the courage of the women who preceded us and fought for the rights we enjoy today. It also shows the strength of women who, in the face of highs and lows, remained resilient. These highs and lows are symbolised by the stairs. In terms of skin tones, efforts were made to diversify and represent the entirety of women. The smaller female elements are protected by the "wall" and within this safe environment they are taught the power and importance of unity, fostering sorority amongst women. These smaller female elements are arranged in a circle, which represents the cycle, the constant, the female routine, but also the persistence of the feminist movement. Lights in shades of purple were placed inside the piece, as shown in figure 5. This colour represents liberation from fears, worries and anxieties.

Conclusions

This project serves as a good example of the relationship existing between art/teachers/researchers, a concept widely used by educators in art-related school subjects, which advocates for a connection between art, teachers and researchers. This relationship between the three concepts contributes to professional appreciation, particularly in the field of art teaching. In challenging conventional wisdom about specialisation and professional identity, many authors advocate for the development of a theory that will reflect and influence good practice in the field of art and among artists.

This approach serves as a valuable resource for those whose professional or creative careers encompass multiple aspects of art, research and education. Engagement with this type of practice paves the way for new approaches, fresh insights, and a constant update that strengthens the formation of identity, roles, and professional practices. This terminology and its implications contribute to cultivating a critical and reflective performance among teachers, whose responsibility is to be efficient, reflective, and flexible. For this to happen, teachers have to investigate, observe, analyse, and, most importantly, reflect on their own practice. They are expected to keep an open mind toward new technologies, concepts and media, and adapt their practice to the school context to be competent educators.

Considering that this subject is part of the Master's Degree in Teaching of Visual and Technological Education in Basic Schooling, it is pertinent to reflect on how we can apply these learnings to the corresponding subjects. We will start by highlighting the advantages offered by our approach. One of the main advantages of using the virtual environment as a teaching resource is its vast creative possibilities. In this environment, we can create things that would be impossible to create in the physical realm, providing an excellent exercise for students. Another advantage is the potential to engage students drawing from their interest in new technologies, a strategy that has repeatedly proved effective in increasing younger students' motivation. This motivation is largely due to the contemporary concepts of parallel virtual worlds that shares many similarities with video games.

However, there are some disadvantages to consider.

First and foremost, we have to highlight the level of complexity inherent to this endeavour. Even if students are familiar with technology, using this type of platform requires time for them to get properly acquainted. Additionally, considering the reality of public schools in Portugal, there may not be enough resources to work with this type of tool. This would require computers powerful enough to support the programme and an adequate internet connection for all students. However, in the present case, a solution to this problem appears to have been found by exploring the future reality, encouraging the exercise of freedom to defend ideas and protest when necessary, and conveying a message for a better future for all.

In conclusion, exploring the potential of the virtual environment as a teaching resource allowed us to identify a series of advantages and disadvantages. Finally, it should be emphasised that the virtual environment offers unique creative opportunities, enabling the creation of elements that would be impossible in physical reality and that are highly stimulating for students. With a conscious and balanced approach, we can explore the possibilities offered by this tool, preparing students for a future in constant evolution where technology plays an increasingly significant role.

1 "Primitive Object (prim): It is an object made of a single part. In SL and OS Grids this means single objects you can build from the interface - building tool (Sousa, C.C. 2017)."

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Virtual Environments for colour-blind people

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Abstract
The purpose of this article is to investigate how colour-blind individuals can perceive and experience art in virtual environments. To achieve this goal, we carried out a literature review on colour blindness and its characterisation, analysed some works of art created by colour-blind artists and how they have been able to harness their disability, and explored some projects and artists found in the Metaverse. Finally, we studied the ColorADD language and its potential uses. Based on this analysis, we carried out a project designed to build a virtual environment using the Craft World grid, featuring works of art that used the application of ColorADD symbols and their corresponding colours. We concluded that art in virtual environments can also be experienced by colour-blind people. This study aims to make a small contribution to the inclusion of colour-blind individuals in virtual environments.

Palavras-chave: Ambientes Virtuais, ColorADD, Daltonismo, Trabalho colaborativo.

Introduction
Is it possible to paint without being able to distinguish colours, or can a colour-blind person be an artist?
Colour blindness is the common name for dyschromatopsia, an inability to see colour. The term was popularised in honour of John Dalton, a physicist and theorist who first systematically published about dyschromatopsia in the 1790s (Emery, 1988; Hanaway-Oakley, 2019; Morijo et al., 2020; Pereira, 2022; Rossi, 2019).
Even before Dalton's time, different doctors and philosophers wrote about cases of people who didn't see colours as well as others. The study of the disability intensified, leading to the development of larger number of colour blindness detection tests. Nowadays, the test developed by Ishihara, a Japanese ophthalmologist, and the Colour Assessment and Diagnosis (CAD) from the City University of London are among the most widely used methods for detecting colour blindness, although it is widely acknowledged that the latter is more accurate than the former (Hanaway-Oakley, 2019).
Seeing the world in a different colour cannot (and should not) be a barrier to being an artist in any form of expression. In the visual arts, colour is fundamental as the artist expresses emotions, ideas and messages through it. However, for a colour-blind person the visual interpretation of a work of art is completely different. The relationship between colour blindness and art was a problem that we identified and that perception became the motto for a study whose primary goal was to provide an answer to the research question: How can art be perceived by a colour-blind person in a virtual environment?
Just like art in general, truly emergent experiences in virtual environments depend largely on vision and on how people can appreciate the surroundings in which they are immerse. Naturally, this can represent a significant difficulty for colour-blind individuals. As such, the aim of our study was to provide colour-blind people with an experience of the colourful world in virtual environments, allowing them to appreciate artworks where colour has a strong presence.
We started with a theoretical analysis of colour blindness, its identification and general characterisation. Then, we examined several colour-blind artists and the way they used their creativity to express themselves. In the third phase, we identified some artistic projects in virtual environments. Finally, we conducted some research on the ColorADD language and it usefulness in the project. The literature review based on works, articles and theses relevant to the study was the research method used
The project was planned and carried out entirely online, on the OpenSimulator platform, using Firestorm Viewer[1] , in strict accordance with the objectives we set out to achieve.
This article is divided into three main sections: 1) state of the art, where we present the theoretical framework of the project; 2) descriptive memory, that includes the description of the processes and details that would result in the final product; 3) final product, where the formal and conceptual characteristics of the project are revealed. The conclusions of the study will close the article.

1 The Phoenix Firestorm Project Inc. is a non-profit organization whose mission is to enhance user experience in Second Life and other virtual worlds by providing an advanced open-source viewer with greater features, options and interface flexibility than those offered by Linden Lab (The Phoenix Firestorm Project Inc., 2023).

1. Framework

1.1. Characterisation of colour blindness

Rebecca M. Shulman (2017) explains that "the ability to see colour depends on the presence in the retina of cone cells, photoreceptors that contain pigments responding to different frequencies along the spectrum of visible light" (p. 35). For Shulman (2017), there are three types of photoreceptors in the "normal" eye that correspond to light of long, middle and short wavelength, respectively red (R), green (G) and blue (B). Therefore, colour blindness is the inability to distinguish shades of a particular colour, an entire colour or even all three primary colours, depending on one's type of colour blindness.

This condition is associated with genetic issues, specifically an abnormality on the X chromosome, which makes men more commonly affected since for women the abnormality must be present on both X chromosomes (Morijo et al., 2020; Shulman, 2017).

The types of colour blindness can be dichromatic, trichromatic and monochromatic or achromatic. Dichromatic colour blindness occurs when a person does not possess one of the three photoreceptor types, or when one of them does not function correctly. It can be divided into protanopia (inability to see red), deuteranopia (inability to see green) and tritanopia (inability to see blue). People suffering from trichromatic colour blindness, on the other hand, possess all photoreceptor types but have difficulty distinguishing colours correctly. This type of colour blindness is divided into three different types: protanomaly (reduced sensitivity to red), deuteranomaly (reduced sensitivity to green) and tritanomaly (reduced sensitivity to blue light). The last type, monochromatic colour blindness, is the rarest and is characterised by the absence of colour vision. People affected by this condition can only see different shades of grey ranging from white to black (Pereira, 2022; Shulman, 2017; J. Silva & Mota, 2018).

1.2 Colour-blind artists

Physician and media designer Kazunori Asada used his personal blog to share an experience he had at the Hokkaido Colour Universal Design Organisation (HCUDO) after visiting the "Colour Vision Experience Room" where some of Van Gogh's paintings were on display. The room was equipped with light and filters meant to show people with colour vision how colour-blind people were able to see the artist's paintings.

Asada was amazed to see Van Gogh's paintings in a different light and went as far as to claim that the paintings as perceived by a colour-blind person were even more interesting (Asada, 2013). Based on this experience, Asada created software capable of simulating the same experience he had in the room he had visited and published two versions of some of Van Gogh's art so people could realise how those paintings are seen by a person with normal vision and by a colour-blind person. Based on this study, Asada concluded that "it is reasonable to imagine that, possibly, Van Gogh's colour vision also differed from the normal or "ordinary" and that he formulated rules on how to choose and use paints that were optimal for his eyes" (Asada, 2013, para. 46), although he also stressed that "the premise of this guess may be wrong".

On the other hand, several ophthalmologists have analysed Van Gogh's works and because of the colours he used, where all the objects have a yellowish tinge, they suggest that the artist may have suffered from xanthopsia, a visual disorder in which all objects observed by the patient's eye appear yellowish. This disorder might have been caused by the use of medicines using components such as foxglove (González, 2020). Van Gogh's works are characterised by a peculiar use of light, colour and thick brushstrokes.

Another colour-blind artist worth highlighting is the late Australian Clifton Ernest Pugh (1924-1990). His colour blindness was of the protanopia type, which means that he couldn't distinguish between greens, yellows and reds (Shulman, 2017; Skoyles, 2010). In the 1950s, his painting was characterised by the depiction of indigenous flora and fauna in an interpretative, figurative and rather dramatic style, in contrast with the sentimentality of the Heidelberg School he attended (Allen, 2012). Like many other artists, Pugh showed that colour blindness was not a hindrance to creating art, and even received the Archibald Prize on three occasions, in 1965, 1971 and 1972 (Allen, 2012; Skoyles, 2010). Allen (2012) recalls that Pugh's work "is represented in most Australian public galleries and in many overseas collections" (para. 9).

Nowadays, there are also several artists who, despite suffering from this disorder and not being capable of seeing some colours, prove that it is possible to create artworks in their own way and methods to use colours where they want to. One such case is the illustrator Tiago Ots, who breathes life into many cities with his graffiti using bright colours and endless creativity. His vision is enshrouded in shades of beige and brown, but as he himself says, there are "many colours that I don't see, but nothing stops me from using them" (Ristow, 2016, para. 8).

Another example is photographer and publicist Luiz Filho. It was his mother who noticed his colour vision problem when she saw that her son was painting his drawings with "inverted" colours. To help her son overcome this situation, she decided to write the colour names on the pencils he was using. With his work, Filho wanted to show the perception of colour-blind people. In one of his works, he used only black and white, in another, he used creamy white, and, in a third, he used different colours. When Filho exhibited his work, he advised visitors to download an app that simulated three different degrees of colour blindness, altering his own photos so that they could have the same perception as colour-blind people would have when viewing the same images (Santos, 2022).

Mark Liam Smith (1973-) is an English painter who currently lives in Toronto. He is another colour-blind artist we wish to highlight. In his paintings, he works primarily with oil paint and views his colour blindness as a strength rather than as a weakness (Smith, n.d.). Smith (as quoted in Galerie Youn, 2022) states that for a long time he tried to rely on his knowledge of colour mixing to recreate skin tones or other real-life colours from his surroundings, but practice made him realise that the use of those local colours was restricting his expression. He then began to detach himself from these types of colours and found his own style of representing still life scenes, which he greatly identifies with, but adding a modern look, as he says: "As a result, I use a hyperchromatic palette in lieu of a local one, creating bouquets and memento mori that, hopefully, build on the tradition of floral still-life painting" (Smith, as quoted in Galerie Youn, 2022).

Mark Smith's paintings are highly saturated and often do not follow the pattern of reality. Smith "draws on his linguistic background to inject narrative and symbolism into his paintings" (Galerie Youn, 2022, para. 6).

Mark Smith has held several exhibitions in cities such as Montreal, Toronto, London, and New York and has participated in art fairs like SCOPE Basel, Art Seattle, Art Toronto, Papier in Montreal and Toronto Edition, among others (Smith, n.d.).

1.3 Artistic initiatives

In 2019, prototypes were developed and paintings were adapted for people with deuteranomaly. These paintings were developed in 2019 during a scientific research project funded by Fapesp that focused on "Realistic painting and dyschromatopsia: relational aspects between natural colour and temporal perception in works of art adapted and non-adapted for individuals with deuteranopia" and were designed in such a way that both deuteranomalous and non-deuteranomalous people could appreciate them in the same way.

The aim was to convince people they should not be “concerned if they cannot perceive the works of art as they really are" (Gama & Bamonte, 2020, para. 16), since several people with deuteranopia had reported feeling frustrated when they have to face works of art and museums. A few years earlier, in 2014, at the National Gallery in London, this topic grabbed scientist Joseph Padfield’s attention.

In his "Making Colours" exhibition, Padfield designed an interactive system using LED lights to apply different light conditions to artworks created by famous artists such as Degas and Monet, whose works are rich in shades of blue and red. His purpose was to make colour-blind people's brains to perceive colours differently. Padfield explains that "the reason why we can almost make the painting dance is that not all of the red pigments are the same. But under certain light conditions, they will all look the same, even to people with normal colour vision" (Masters, 2014, para. 11).

That way, art can be inclusive and everyone can understand it the way the aforementioned artists wish to convey. Even more important, one should strive to make sure that differences are accepted from a young age, so that colour-blind people do not grow up with insecurities and can freely express art as they see it through their own eyes.

1.4 Projects and artists in the Metaverse

First and foremost, it's important to define that the Metaverse is a 3D online universe that combines different virtual environments where users can work, meet, play and socialise (Zippergaleria, 2022). In these environments, "people interact through their digital manifestations, the avatars" (Sousa & Eustáquio, 2016, p. 490). This world opens doors to countless possibilities, including in the field of art. For example, the Louvre Museum (among others) offers virtual tours where people can walk around the museum and see the artworks on display from anywhere in the world, provided that one has internet access. Countless projects and artists could be mentioned, but we'll focus on a few that, in some way, served as inspiration for our project.

MUSEU.XYZ, located in the XYZ District, is one of the many projects that have emerged in the Metaverse. As stated on the project's website, "MUSEU.XYZ is a virtual space for the experimentation of Brazilian digital art and culture in the metaverse" (MUSEU.XYZ, 2021, para.1). Participation in the project is diverse, ranging from artists and researchers to institutions working in co-creation to maintain it. It was created in 2021 with the aim of building "a decentralised museum" (MUSEU.XYZ, 2021) in multiple metaverses, as they claim, enabling a wider reach. MUSEU.XYZ was initially created on the Cryptovoxels platform, but has expanded into Decentraland and Sandbox (Possa, 2022).

MUSEU.XYZ (2021b) operates in three core areas: 1) exhibitions, festivals and events; 2) education; 3) archive and memory. It currently has a permanent exhibition, the Genesis Gallery, which showcases Brazilian NFTs [2] (Possa, 2022).

It was the inclusion factor that led us to include Yam Karkai. As an artist and illustrator, Karkai created the World of Women (WoW) project together with three other friends. The project was launched on July 27, 2021 and has already released its second collection of illustrations. WoW is a project whose aims are to draw attention to the need for greater representation and inclusion of women in the production of NFTs. As the community itself states, its vision is to "create a collection and community that celebrates and increases representation, inclusivity and equal opportunities for all" (WoW, n.d., para. 4).

According to ArtTactic (cited by Gorzoni, 2022), in 2021, only 5% of the NFTs sold on Nifty Gateway were women’s creations. While it is true that many women are starting to produce NFTs, their representation is still quite small (Gorzoni, 2022). This project already includes thousands of works by artists from all over the world and quickly caught the attention of The Sandbox, leading to a 25-million-dollar partnership between WoW and The Sandbox to "encourage the entry of women into the metaverse and their involvement with NFTs through the provision of courses and acceleration programmes" (Silva, 2022, para. 1).

Finally, we'd like to highlight Fvckrender’ work, a futuristic tech-digital artist who uses futuristic landscapes, architectural geometry and shiny or Beeple-inspired paintings. Fvckrender is a prominent figure in the NFT Art market (Crio. Art, 2021) and his works stand out for their political and social engagement, while his notoriety strongly contribute to making digital art recognised, valued and increasingly present.

1.5 ColorADD

ColorADD was born more than ten years ago and is "a unique, universal, inclusive and non-discriminatory language that allows colour-blind people to identify colours whenever colour is a factor of identification, orientation or choice" (ColorADD Code, 2022, para. 2).

Miguel Neiva (2020), the designer and creator of ColorADD, argues that his concern for the social integration of more than 350 million colour-blind people around the world led him to create this visual code. He worked on the project for eight years "with the support of 146 colour-blind individuals from all over the world to identify the cultural issue, and worked with different experts, eye surgeons, ophthalmologists, and university professors" (Lusa, 2020, para. 6).

The ColorADD language combines simple graphic symbols with the colour addition theory. Five graphic symbols are used to represent each of the three primary colours plus white and black. The combination of those five symbols allows colour-blind individuals to identify the remaining colours. As a language, the aim is that colour-bling people can learn it and read it, as explained by Tiago Santos, a colour-blind person and brand consultant for ColorADD (ColorADD The Color Alphabet, 2016). The colour code includes light, dark and metallic shades, as well.

Today ColorADD is used in multiple applications related to clothing and textiles, educational games, food product packaging, public transportation services, public spaces and environment, sports, culture and leisure or healthcare and hospitals. Because it is a combination of simple graphic symbols, ColorADD is easily learned and perceived by people from any part of the world. That's the reason why we turned to its language.

2 "A Non-Fungible Token (NFT) is a technology that allows the ownership of a non-fungible good to be registered in a distributed manner. Therefore, the NFT is a token or certificate that proves ownership of unique items" (...) "Currently, NFTs are widely known for facilitating the purchase of virtual works of art" (Mendonça et al., 2022, pp.53-54).

2. Descriptive memory

Since the authors of this project live far away from each other, it was entirely planned and developed online in a virtual environment.

During the first meeting, each of us came forward with some suggestions. After hearing all the proposals, we decided to work on colour blindness and its relationship with art. The essence of the project was to recreate in 3D some paintings by famous artists and apply the symbols of the ColorADD language to allow colour-blind people to have a more realistic experience when they appreciate art in a virtual environment. To achieve this, we had to research and study this new world and use a platform (OpenSimulator, in our case), where we created our avatars to interact with this world.

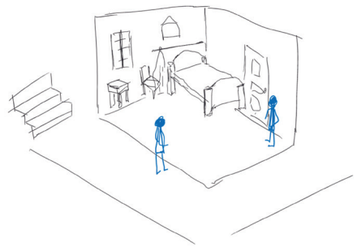

Fig 1. Sketch of the initial idea

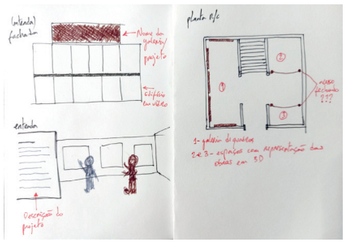

Fig 2. Rough sketch of the building and organization

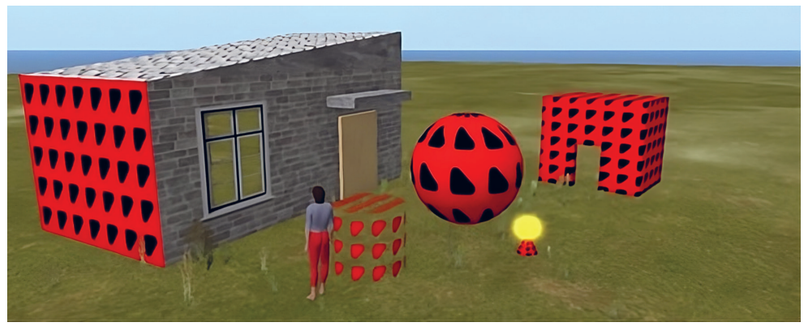

Fig 3. ColorADD symbol application test

2.1 Creative proposal

The first work we considered recreating was Vincent van Gogh's "Room in Arles". The idea was to use the painting as one of the rooms in a house, as Figure 1 illustrates. The other rooms would include other works of art that suited the purpose of the project. In the early stages of the project, this seemed to be the most appropriate direction to follow, however we ended up introducing a few changes to the way we were working and selecting the artworks. Following the creative discussions maintained with our professor, we decided to include, not only the works of famous painters, but also the productions of other contemporary and lesser-known artists.

After giving much thought to the matter, we decided to create a virtual museum composed of paintings and art installations. We believe that this change turned out to be beneficial, as people immediately identify a museum with art and this makes it easier to understand the project's objectives compared to the house concept we initially had in mind. We outlined the layout of the different elements (Figure 2), the colours of the walls, the name of the museum and what its façade would look like. As for the name for the museum, and after several suggestions,

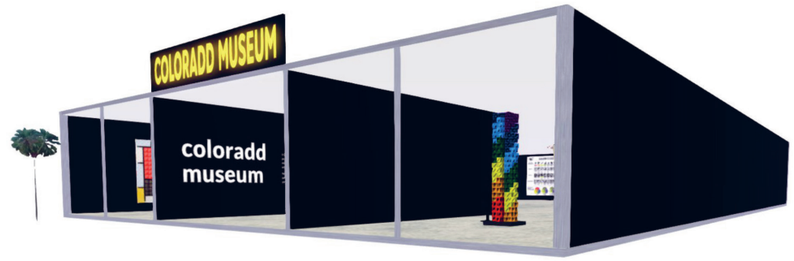

Fig 4. – Front and right-side views of the museum

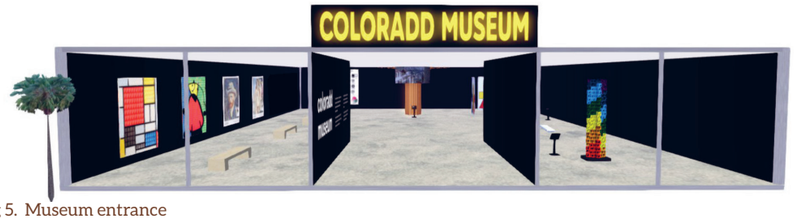

Fig 5. Museum entrance

we chose the one that, in our opinion, best identified the project - ColorADD Museum.

2.2 Experimentation

The starting point for entering a virtual environment was the creation of our avatars, which we created in Craft World. The next step was to install the Firestorm viewer.

To start the project, we carried out some initial experiments in a Sandbox. One of the key experiments was to test how the ColorADD symbols would look when applied to objects.

If we failed do this or if the symbols weren't perceptible, the purpose of the project would be compromised. We confirmed that the symbols looked exactly as we intended (Figure 3) and could proceed with the project. After some experimentation and trial and error, we were able to build objects, apply textures and upload images to be used as textures on the objects. We tried placing plants outside the building and importing 3D objects modelled in software such as Blender and SketchUp, but it didn't always work out well.

2.3 Implementation

We created the museum building, which was initially planned with two floors. However, since at this stage of the project we were only going to use the ground floor, we decided to remove the upper floor. The final building was divided as follows: the entire left wing of the museum would be dedicated to paintings, while the right wing and the entrance would feature art installations. Figures 4 and 5 show the building created in Craft World. We chose a building with straight lines, simple architecture and large stained-glass windows to give it a modern look. we predominantly used neutral colours for two distinct reasons: to ensure that they would not have an impact on colour-blind vision, and, at the same time, to highlight the works on display.

In order to help visitors understand the purpose of the museum, we placed a short description of the project in both Portuguese and English on one of the entrance walls,

Fig 6. Description of the project placed at the museum entrance

Fig 7. Creation of the name to identify the museum using Affinity Photo

as a way to reach a wider audience (Figure 6). Outside, we put up a sign with the name of the museum. Both the sign and the wall description were images created using Affinity Photo software (Figure 7) and then imported into the virtual environment
We had to establish certain criteria and select just a few artworks, namely: 1) we had to exclude black and white works, as they do not pose any sort of difficulties for colour-blind people, and 2) we had to include artworks with a broader range of colours, for they are the most difficult for colour-blind people to perceive. Each of us conducted his/her own research on artworks and, together, we discussed the possibility of including

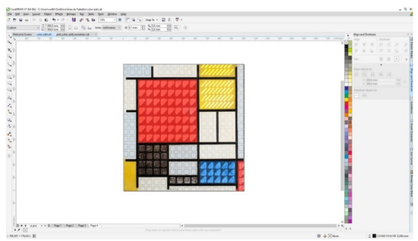

Fig 8. Painting by Mondrian with ColorADD symbols

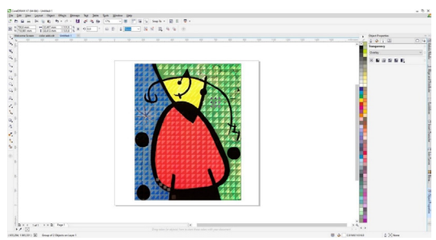

Fig 9. Painting by Miró with ColorADD symbols

them in the museum.
To display the art paintings in the museum, we created an object in the shape of a canvas and applied the desired texture, a painting by Piet Mondrian and another by Joan Miró, together with the ColorADD symbols (Figures 8 and 9).
First, we had to vectorise the ColorADD symbols using CorelDraw and then apply the corresponding colour using an overlay. Once the image was finished and saved, we imported it into our Craft World inventory and applied it to the object. This process was necessary for each painting, as well as for the installation created by the artist Carla Filipe.
In addition to the art pieces already mentioned, we included one by Vincent Van Gogh and another by Sandro Botticelli, which had already been recreated with the ColorADD language by the artists Flavio Waiteman and Ronilton Costa. The process of applying them as textures was similar to that described earlier. We also included the entire ColorADD alphabet next to the paintings for visitors who were not familiar with the language.
Once the paintings had been placed, we proceeded to create three art installations - one by Vicente Peñataro, one by Joana Vasconcelos, and another by Carla Filipe.
For the productions created by Peñataro and Vasconcelos, we used the repeat per meter function to adjust the colourADD symbol to the shape of the object.
We started by including Vicente Peñataro's work, a tree-shaped installation created in bronze that is part of a multimedia installation at the Museo Argán (Morocco). This piece was included because of its connection to multimedia, adding diversity to the project. The object was modelled in SketchUp and imported into Craft World (Figure 10), where we inserted a shiny object to simulate the original.
Next, we chose Joana Vasconcelos's work "Coração bacalhoa" because it was so colourful. This work ended up being modelled in Craft World (Figure 11), as it was distorted when imported from other software.
The last installation to be included, "Hóspede" (Guest), was created by artist Carla Filipe. In addition to being an installation with a lot of different colours, it holds political, historical and social relevance. It portrays the 28 EU Member States to "an entity of uncertain permanence" (Serralves, 2022, para. 4) and criticises the lack of international solidarity, proposing a shift from "hostility to hospitality" (Serralves, 2022, para. 5). We decided to represent only a few flags, due to space constraints. The texture for each flag was created using a process similar to the one used for the paintings, which has already been described. The structure of the flags was created within the virtual environment itself (Figure 12 and Figure 13).
With the installations completed, we tried to find the best way to include a screen where we would play a video about the origin of the ColorADD language, narrated by its creator. The original artwork by Peñataro mentioned earlier consists of several screens suspended from the "branches" of the tree, which gave us the idea to include the video. Since the video is narrated in Portuguese, we added English subtitles to make it accessible to a wider audience. Finally, we placed a notice on the pulpit located in front of the screen telling visitors to activate their media options to be able to watch the video. We set the video to auto play and auto loop mode to help visitors. Figure 14 shows the result.

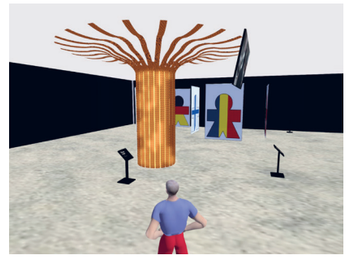

Fig 10. 3D Peñataro's tree in Craft World

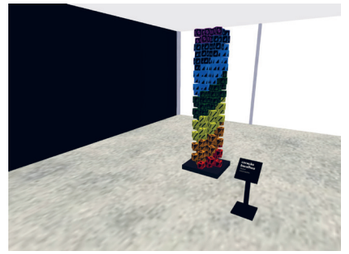

Fig 11. Representation of the «Coração bacalhoa» installation by Joana Vasconcelos

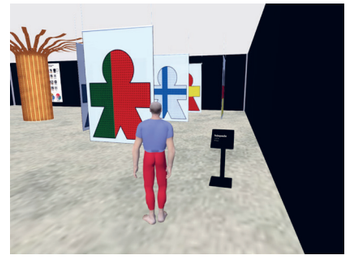

Fig 12. Representation of some of the flags from the «Hóspede» artwork

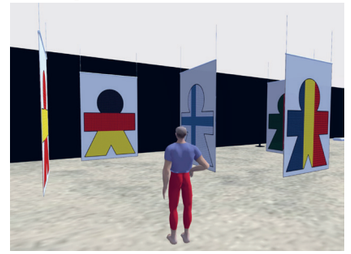

Fig 13. A different perspective of the representation of the «Hóspede» art piece

3. Final product

Our final product is an art museum located within a virtual environment, designed for colour-blind individuals, but not exclusive to them. As far as the building is concerned, we tried to use only neutral colours, since

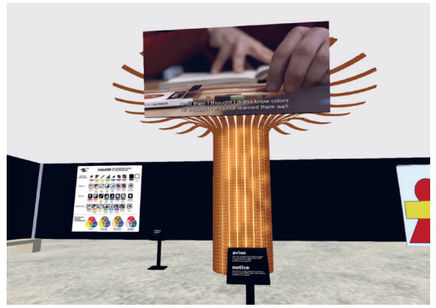

Fig 14. Video on the history of ColorADD narrated by its creator

they don't pose a difficulty for colour-blind people. We chose different shades of grey for the floor for the same reason. This neutral environment allowed the works of art to stand out, since they are the museum's main attractions. As for the works of art, our concern was completely different, i.e., we included very colourful pieces, given the challenge they pose for people with colour blindness.

From a formal perspective, the museum consists of a ground floor, about thirty metres wide, fifty metres long and about six metres high. The name of the museum is written on a signboard placed on the roof with a length of approximately nine metres and a height of one metre seventy. The entrance is spacious and on one of the walls there is a description of the project, so that visitors can easily become familiar with its concept.

Inside the museum there are four paintings by famous artists, replicas that were adapted to fit the concept, each measuring approximately four metres by four metres. Next to these paintings, a square panel measuring around five metres features the ColorADD alphabet. At the end of the central corridor and in the right wing of the museum, visitors can find the three art installations. The installations vary in height from about two to four metres. The museum includes a screen with a video set to loop and auto-playing modes, showing the origin of ColorADD. Finally, three small pulpits identify each of the three works and their respective authors. To provide a relaxed experience, visitors have six benches at their disposal where they can sit and calmly enjoy the artworks.

Conclusions

With this project we have come to realise that there is a lot to explore in virtual environments and that they offer a wide range of creations and projects that are limited only by one's imagination. However, exploring and experimenting with all their potential would require a tremendous amount of time.

One of the contributions of virtual environments is precisely the simultaneous collaboration on the same project of people from different parts of the world, irrespective of how far they may be from each other. With this project, we realised that it is possible to break down geographical boundaries and work in full partnership with someone who lives almost 1500 kilometres away from us, as if we were in the same real space, watching our avatars and engaging in real-time conversations.

We believe that this project has addressed the initial problem and that we found a solution, certainly one of many, to allow art and virtual environments to be experienced by colour-blind people in a way that feels more authentic and meaningful to them.

The ColorADD language has proven to be consistent and perfectly applicable in countless situations, and since it uses symbols that can be universally learned, we came to the conclusion that it was an excellent tool to be used in our project.

While our project focused on the relationship between virtual environments and colour blindness, we became aware that many colour-blind artists are capable of creating their own art using colour combinations that they have established themselves, some sort of personal code that they use both in realistic and abstract representations. Unfortunately, we were unable to obtain information on whether any colour-blind individuals had visited our project.

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Authentic praise

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Abstract
This chapter, conducted as part of the Artistic Observation and Intervention Methodology course within the Master's Degree in Teaching of Visual and Technological Education in Basic Schooling at the Polytechnic Institute of Viseu - School of Education, seeks to explore issues related to plagiarism, appropriation, copying and authorship using virtual environments, and develop a group artistic project centred on the aforementioned topics. To this end, a brief theoretical framework was outlined and a review of the existing literature was conducted, always looking for a connection to the artistic practices developed over time around these themes to understand their evolution and the potential need to reconsider the definitions of these concepts to mirror today's global context.
Building on the concepts put forward by Walter Benjamin (1955) in The Work of Art in the Age of Its Technological Reproducibility and Pierre Huyghe's piece The Third Memory, we aimed to create an artistic project within a virtual environment that could explore the possibilities of appropriation of works developed within the context of the aforementioned course.
To achieve these goals, data was collected through the conduction of interviews with the various groups, using audio recordings. In addition, photographic records of the work created were made or requested. The data collected was subsequently analysed and manipulated to be included in a virtual installation created by the members of this group.
Given the growing influence and presence of digital technologies in the production, dissemination and perception of information, even within the artistic and cultural sphere, the use of digital platforms has become more and more important to understand the current possibilities of exploring these concepts. Testing their limits and how they are received by the general public has also become increasingly crucial.
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Keywords: Appropriation, Authorship, Copy, Plagiarism, Reproduction.

Introduction
The aim of this research is to develop and comprehend concepts related to plagiarism, appropriation, copying and authorship, how they have been addressed over time and the potential need to rethink them in the light of our current context.
The research work conducted began with a reflection on the concept of image itself and how it has always been intrinsically linked to the notion of copying and representation, and has, therefore, always raised questions about authenticity and originality.
Subsequently, an attempt was made to contextualise the addressed topics, namely by trying to understand how they relate to each other and by tracing their evolution up to the present day. Throughout the research, our aim was to highlight artistic practices developed over time around these concepts. Other highlights include, for instance, the cultural appropriation movement, which gained prominence in the 1970s, and analyses of the works created by Elaine Sturtevant, Louise Lawler, Cindy Sherman, Sherrie Levine and Michael Mandiberg.
Then, a brief overview of the current status was provided, serving as the foundation for the introduction and implementation of the project.
Finally, the entire creative process is described, including the stages related to experimentation, execution and the testing of the project carried out within a virtual environment. Several images illustrating this journey are also provided. Throughout the development of the artistic project, the aim was to explore and experiment with appropriation and define what appropriation really stands for in digital platforms and virtual environments, testing its applicability within this context.

1. Framework
1.1. Image
If we set out to reflect, first and foremost, on image itself as a concept, we find it difficult to define as it can encompass different and multiple meanings. Roland Barthes (1990), in his work "Rhetoric of the Image", begins precisely by tracing the etymological root of the word, imitari. Plato, in one of the earliest definitions of the term, associates "images, in the first place, with shadows and, in the second place, with reflections in water and solid, smooth and polished bodies and the like" (Plato, cit. by Magalhães, 2005, p.18).

> [The image is] present at the origin of writing, religions and art (...) [It] has also been a crucial topic in philosophical reflection since antiquity. Plato and especially Aristotle contested it and defended it for the same reasons. As an imitator, for one it has the potential to deceive, for the other it educates; it can divert from truth or, on the contrary, guide toward knowledge. For the former, it seduces the weaker parts of our soul; for the latter, its effectiveness lies in the pleasure it provides. In Plato's words, the 'natural image' (reflection or shadow) is the only truly graceful image, the only one that can become a philosophical tool (Joly, 1994, p.18).

Turning once again to Barthes (1990), the author raises the question: can a "copy" generate true meanings? And he reinforces the dual nature of conceptions surrounding the image: is it a limited system compared to language or, on the contrary, does "the ineffable richness of the image" (p.27) imply that its significance cannot be exhausted?
According to Contrera and Hattori (2003, p. 26), image is "the commonly used term to designate graphic or verbal representations of something that exists or could exist", in

other words, image is the representation of something through resemblance or similarity.
From Bergson's perspective (cited by Areal, 2012), "an image is more than a “representation” and less than a “thing" (Areal, 2012, p.60). An image has a constructed character, whereas the concept of representation is related to the optical image, a process that implies "making something absent present" (Bergson, cit. Penafria, 2003, p.1). For Joly (1994), the image is the culmination of the entire human evolutionary process, shaped and influenced by various dimensions: natural, religious, social and cultural.
It can then be accepted that an image is not merely the result of a technical transformation (optical, photographic, videographic, digital, etc.), nor is it a simple attempt to represent reality. Images, whether natural or manufactured, are inevitably subjected to perception and interpretation: none of them acquires meaning without someone assigning it to them, whether it’s the subject who takes the photograph, uses a microscope, paints or simply observes it (Areal, 2012).
In addition, the concept of an image is also viewed as a metaphor, an act of symbolising and conceptualising, serving as a representation of something (Areal, 2012). Thus, not only are the ideas of representation and reproduction associated with the concept of the image from the beginning, but it also holds true for concepts such as authenticity, originality, copying, forgery and plagiarism.

1.2. Plagiarism, copy and reproduction

The notion of plagiarism as an act of stealing ideas, language and images (Foletto & Franceschi, 2001) stands in clear contrast with the notion of reproduction as a form of learning, dissemination, and social and cultural configuration, since it is through imitation or copying, through the interaction of individuals with their socio-cultural context, that human development happens (Branco, 2003; Valsiner, 1989, cit. by Pinto, 2007).
Back in ancient Greece, the practice of reproducing content without mentioning its origin was not only valued but also encouraged. The conceptions of Hippocrates, Galen or Aristotle were repeated and paraphrased for centuries (Osler, 1913, cit. by Ribeiro, 2019), and this act of reproduction was associated with the dissemination of information and knowledge. Transposing this concept to the realm of artistic creation, Walter Benjamin (1955) also addressed this issue. Not only has it always been possible to reproduce works of art, but it was also encouraged among masters and disciples, and this practice often contributed to the dissemination of artworks (Benjamin, 1955).
Being original was neither a requirement nor a necessity. It was common for assistants in painting workshops to continue working by mimicking their master’s style after his death or simply in his absence. Schäufelein, for instance, was a disciple of Albrecht Dürer who often recombined elements from existing works to produce new ones (Korey, 2005, p. 38).
Another example is Leonardo da Vinci's Mona Lisa and the artwork displayed at the Prado Museum in Madrid, which is attributed to Andrea Salai or Francesco Melzi, both apprentices of da Vinci. Both paintings were produced around the same time (Lima, 2018).
According to Salamon (2007), originality involves the creation of a distinctive and individual mark, although this does not necessarily imply the absence of repetition. Altering compositions, using pictorial characteristics from other paintings and compiling all these elements into new creations can be an act of originality. Originality not as an invention, but rather as recognition and repetition. In this sense, originality is not something absolute, but something that depends on time, contexts and traditions.

In this context, we can analyse Vincent van Gogh's painting, 'The siesta', from 1890, and clearly recognize the influences of Millet's, 'Noon-day rest', from 1866 (Lima, 2018). According to Lima (2018), it is important to consider the period in which the painting was created, taking into account that the artist's intention could have been to replicate the work of someone he admired. Thus, copying would not be seen as a fraud, but rather as a means of learning or paying tribute, as a way to improve and contribute to artistic practices.

1.3. Technical reproducibility

During the Renaissance, concepts such as the perspective or the rationalisation of the gaze in the representation of space emerged. Perspective, regarded as a method to transpose three-dimensional reality into a two-dimensional representation, establishes a correspondence between the image and the object based on a system that goes beyond representation of the mere observation of reality, obeying a set of rules established by that same system and taking on the responsibility of faithfully reproducing reality. This responsibility would later become one of the main characteristics of photography, thereby revolutionising once again the relationship between reality and its representation (Marques, 2007).
However, along with other reproduction techniques that preceded it, such as woodcuts and lithography, precisely because they could be produced in series and on a large scale and could therefore be easily disseminated, it also heralded a paradigm shift in the concept of the artwork, raising a series of issues, because, on the one hand, it facilitated dissemination and access to a much broader audience, but on the other hand, the ease of copying inevitably called into question certain issues related to originality, authorship and the veracity of the images themselves.
Walter Benjamin also draws a distinction between manual and technical reproduction - in which the idea of the uniqueness of the work of art created through a non-mechanised manual reproduction process, with an aura, something unique marked by its authenticity and originality, clearly clashes with technical reproducibility, where the artwork loses that characteristic and moves from a singular occurrence to a mass occurrence (Ribeiro, 2019).
The author also draws our attention to two fundamental aspects: unlike the original, it is possible through technical reproduction, using photography for example, to select and emphasise aspects of the original artwork that would not otherwise be visible. It also allows for situations that would never be possible with the original artworks, bringing the work closer to the individual and transporting it to other locations. This newly found proximity to the spectator, "removing the object from its shell, destroying its aura", also changes the value of the artwork, shifting from a cult value to an exhibition value (Benjamin, 1955).
While the first works of art served a ritualistic purpose (magical or religious), as objects of worship, always accompanied by some level of concealment - accessible only in churches, cathedrals or even museums - the diffusion of objects resulting from technical reproducibility emancipates the different artistic practices from this specific function.
The reproduced work of art is increasingly evolving into the reproduction of a work of art created to be reproduced. The

photographic plate, for instance, allows for a wide variety of copies and the question involving the authenticity of the copies becomes meaningless. But when the criterion of authenticity no longer applies to artistic production, the entire social function of art changes. Instead of being rooted on ritual, it becomes grounded on another praxis: politics (Benjamin, 1955).
However, this proximity to the masses also entails a more intimate relationship between product and consumer. Following Benjamin's (1955) conceptions, Ribeiro (2019) describes the consumer society and the resulting relationship between the masses and art:

> The smaller the social importance, the less critical the public's attitude becomes. The conventional is appreciated, and what is truly new is met with repulsion and aversion by the public. Masses are interested in entertainment and distraction, while art requires a certain form of contemplation from those who appreciate and observe it. This contemplation implies an immersion in the artwork, unlike the behaviour of the masses, which simply involves absorbing the work of art within themselves (Ribeiro, 2019, p.22).

Within this context, some artistic practices have emerged that already view "culture rather than nature as a source of work" (Evans, 2009, p. 92, cited by Cadôr, 2014, p.21). In this new context, reproduction, appropriation or transformation of common images or objects - such as ready-made or collages - becomes a recurring practice. In the case of Marcel Duchamp, referring to his 1919 work L.H.O.O.Q, Diniz and Terra (2014) emphasise this action by the artist, highlighting the issue of reproducing another work - Leonardo Da Vinci's Mona Lisa - on a postcard, adding a new graphic element, renaming the piece and presenting himself its author.
Other examples worth considering include the collages of Pablo Picasso and Georges Braque, pioneers in the use of collage in art. Since collage involves the reorganisation of elements (such as previously printed papers from newspapers, magazines, and so on.) removed from their original context, this practice raises questions about authorship and originality. Arnaldo Pereira (2001) stresses the historical negative connotation associated with plagiarism, even though the aforementioned works are now recognised as legitimate practices and are perfectly integrated into cultural discourse.

1.4. Appropriation

The concept of appropriation began to gain prominence during the 20th century::

> The artists who were part of the Pictures Generation movement (Robert Longo, Richard Prince, David Salle, Sherrie Levine and Cindy Sherman, among others) combined in their works elements of mass culture and strategies from Minimal Art and Conceptual Art. They gained recognition for adopting industrial processes and removing personal marks from their work. (...) Throughout the 20th century, appropriation became a central topic in debates, movements, groups and theories, such as Conceptual Art, Fluxus, Pop Art, experimental poetry, Oulipo, L=A=N=G=U=A=G=E Poetry, Situationism (Cadôr, 2014, p. 21).

It is important to differentiate between the concepts of reproduction and appropriation: the former is achieved by imitating or repeating the original and copies are easily distinguishable from the model and are generally reproduced in series without significantly altering the original from which they derive. Appropriation, on the other hand, refers to the act of adapting, giving a new purpose, and does not involve forgery but instead involves:

> Reusing pre-existing images that are easily recognisable, so that the previous associations established with the viewer are contextualised in the new works produced. This recontextualization helps the artist reformulate the original meaning of those images or objects and, at the same time, allows the viewer to establish quicker associations with the images that are now presented. (Rebelo, 2015, p. 18)

Douglas Crimp (1983) also makes a distinction between two types of appropriation – the appropriation of a given style, exemplified by Robert Mapplethorpe, who appropriates old works using the same types of composition, themes, poses and lighting, and whose work functions as a variation or a different version of something that already exists, and a direct appropriation of the original work, where the original production (or part of it) is incorporated into the new artistic creation, as in the case of Sherrie Levine.
The second mode of appropriation describes the act of quoting, which involves reusing and referencing a previous image in other works in its original form. While a version functions as an allusion that refers to another work, the quotation can include the entire work, or a part of a work, to achieve a different kind of objective. On the other hand, a quotation may diverge completely from the model on which it is based and incorporate only a few specific elements, fundamentally serving as a strategy that allows for identification, but that at the same time creates differentiation (Rebelo, 2015, p. 19).
In the early 1970s, Elaine Sturtevant replicated works by Andy Warhol, Jasper Johns and Robert Rauschenberg using their original techniques.
Louise Lawler recorded a series of works of art in situ, collectors' rooms or museums, using the "record of the artistic context of the work of art itself, clarifying its modes of presentation, framing and circulation, in an act that simultaneously seeks to achieve legitimisation through borrowing, the conceptualisation of the work itself and the archiving of the modernist legacy" (Marques, 2007).
Cindy Sherman's History Portraits shows a self-reflexive attitude towards appropriation, in which the author takes on the roles of female and male historical characters, working not only from a collective imagery culture, transposing and reorganising it in another context, but she does so in such a way that this representation remains recognisable. Michael Mandiberg, inspired by Sherrie Levine's famous appropriation of Walker Evans' photographs, photographed Levine's copies and titled them "After Sherrie Levine".
Through this act of appropriation, a series of issues inherent to the art world are problematised - authorship, originality, creativity, market value, intellectual property, the space of museums or galleries, gender, history, and identity, among others. These issues have become increasingly visible and tangible, and their paradoxical and contradictory nature have been repeatedly exposed.
Practices of appropriation, copying or plagiarism are recurring actions throughout history and in the most diverse situations, but they take on specific contours within the artistic sphere (McCord 2008, cit. by Ribeiro 2019, p. 24). Just as individuals acquire practices, knowledge and behaviours through their appropriation and integration into their personal sphere, artists appropriate when they use the imagery, concepts and processes of others, adapting them to their own work.

1.5. Appropriation today

Addressing issues of plagiarism, copying and appropriation today is quite different from doing so in the 70s and 80s. Copying, quoting, drawing from examples regarded as significant is the current practice,

which challenges the idea of creating entirely original content. Instead, there is a widespread recognition of the potential for this contamination, of the many opportunities for transforming, giving new meanings, recombining: "This is the age of the recombinant: recombinant bodies, recombinant genres, recombinant texts, recombinant culture" (Critical Art Assemble, 2001).

We are living in the information age and the digital age, where the Internet has become the greatest digital archive, where images, videos, sounds, and words remain constantly accessible and re-editable. Aby Warburg, in his Atlas Mnemosyne, anticipated the language of the Internet: an organisation of images not necessarily in linear reading order but designed in such a way as to enable a dialogue between them, relationships, observations, and confrontations throughout and across time, space, and memory of Western history and culture. Mnemosyne's task would therefore be "to offer and open up visual references not for a history of Art, but for an unthought memory of history" (Didi-Huberman, cit. by Etienne Samain, 2011 p.37).

Although history and collective memory are always shaped by power relationships – what we know about history is often the reflection of the prevailing discourse, the victor's discourse that ruled at a certain time or place -, we are currently dealing with a completely different system of discourse/communication that governs the difference between what should be preserved for posterity and what must be forgotten. The production of what is visible and sayable takes on a different scale: false archives, fake news, alternative facts, and the omnipresence of the Internet as the great archive become major factors that will determinate the conditions of knowledge in our time.

These issues - distortions of memory and the influence of tools such as television, cinema, radio and the Internet – are reflected in Pierre Huyghe's "The Third Memory" – this exhibition is related to a 1972 bank robbery in Brooklyn, which gained notoriety after Sidney Lumet's film "Dog Day Afternoon" (1975). Thirty years later, Pierre Huyghe reenacted the event, this time with the people who actually took part in the robbery. What emerged from this version is the strong influence of the film on these people's performance (Guggenheim, 2023). What we witness is not only an act of appropriation but a reshaping of the truth through the media and their influence on collective memory. "The refusal of the real", as Baudrillard puts it when he describes the consumer society, in which "the truth contemplated, televised, recorded [...] is more important that what is objectively real" (Baudrillard, 1995 p.24).

Today we face alternative visions of knowledge and situations where these visions become truly controversial and manipulative of public opinion. A case in point is the controversy created by the comparison between the attendance at the inauguration of President Obama in 2009 and that of President Trump in 2017, where the numbers of attendees provided were incorrect:

> In 2017, during a television interview, Kellyanne Conway introduced the notion of "alternative facts". After four years of Donald Trump's presidency, we realise that there was nothing anecdotal about her words. Donald Trump is probably right: fake news is not just a minor disruption in the truth/lie dichotomy but a way of living and representing the world. They exist as a kind of magma that oozes through the certainties of our rationality, paralysing the vital materials of our thinking, determining our behaviour, addicting our imagination, and clouding our perception (Lopes, 2020).

The definitions of these concepts - appropriation, plagiarism, copying, authorship, veracity, history, memory – are challenged once again. The current generation of appropriators see themselves as "archaeologists of today", "post-producers", re-editors of the "script of culture" (HiSoUR, n.d.).

> The way knowledge is produced today, and how it is distributed, requires a constant reconsideration and rethinking of the concept of plagiarism in light of new technological developments, as these increasingly expand the number of people who can produce and disseminate cultural materials. Nowadays, it is increasingly easy to access a vast amount of information, and the task of monitoring and filtering out what constitutes appropriation and plagiarism of ideas becomes almost impossible. Fast-growing technological development and easy access to any and all types of information are causing new generations to have very different perspectives on concepts such as knowledge, ownership, acquisition and distribution compared to the previous generation (Jenkins, 2006, cited by Ribeiro 2019, p.24)

The increasing influence of digital technologies, especially through the Internet and social networks, is not only transforming the way knowledge is created, disseminated and perceived but is also causing significant changes in terms of power structures and social configuration (Ribeiro, 2019).

2. Methodology

2.1. Creative Proposals

During the first group meeting, held as part of the de Artistic Observation and Intervention Methodology course to define the starting point for the development of an artistic project, various topics were suggested, including the concept of plagiarism. These topics and a series of related themes and adjacent concepts were discussed, namely the ready-mades, the forgery of artworks, the notion of copying as a didactic practice, and the production of images using Artificial Intelligence, among others.

As a result, some key research axes were defined - inspiration/plagiarism, model, appropriation and citation culture. Additionally, some artistic references, like Sherrie Levine, Louise Lawler and Richard Prince, were proposed.

It was also during this first stage that the hypothesis of "plagiarism" or the appropriation of the works developed by the other groups within the framework of the course was discussed. It was also agreed that the work would be carried out in a virtual environment, since it could provide us with the right conditions to document all the works completed and to keep all the productions in one place without being concerned with physical limitations. It is also worth mentioning that, given the nature of the proposal, the decision was made to keep the project confidential from the other groups, enabling data collection to be carried out with the highest discretion, thus minimising the risk of information distortion and also creating a more impactful presentation of the results.

2.2. Experimentation

The full possibilities of exploring the virtual environment were completely unknown, which delayed some decision-making about the direction to follow. This compelled us to simplify the proposal and collect, using audio recordings of the interviews conducted, the explanation/narration of the projects from their authors and to subsequently appropriate those narrations. Based on the descriptions obtained, a revised version of the project was proposed.

The avatars of the group members were then created within the Craft World virtual

grid, where the project was developed (Balaeniceps Rex and Ramphas Tidae, figure 1).
This was followed by a phase of experimentation within the virtual environment involving the management of avatar movement, their teleportation to other locations, and the building and manipulation of simple shapes (figure 2).
To enable this exploration, a room was created in IPVerso where all the participants could initiate the development of their projects. However, some obstacles had to be overcome, since one of the objectives of the project was to keep it secret until it was fully completed. Nevertheless, all the participants involved respected the project's confidentiality and agreed to take part in the interviews, authorising the audio-recording of said interviews. The completion of this phase was crucial for the future accomplishment of the final work.
Informal interviews were then conducted in the classroom setting and, in the case of working students, this information was collected through online channels (figures 3, 4, 5, 6, 7, 8 and 9). The interviews conducted were then analysed and transcribed.
Then an appropriation of those interviews was carried out. During this stage, they were paraphrased and re-recorded using the voices of the group members.
Simultaneously, the groups started to create sketches of possible solutions for the final project.
The decision to make sound the focal element of our project narrowed down the possibilities for space selection. The audio on the selected platform operates in a way analogous to reality, becoming more or less perceptible depending on the proximity of the avatar to its source.
Therefore, each piece had to be sufficiently distant from the others to prevent sound overlap. The initial solution was to create long corridors that could achieve the desired effect, while concurrently creating a pathway that would guide the viewer through all the pieces.

2.3. Implementation

The construction of the space only became feasible when a room was provided exclusively for the members of our group. It was also necessary to take into account that experienced users tend to prefer using their camera to visit spaces rather than travelling through them using their avatars. This could pose a problem regarding the sound: viewers needed to be encouraged to visit the project using their avatars to ensure that the sound experience turned out as intended. The corridors would also have to be wide enough to facilitate reading and the reception of spoken instruction provided during the journey. Moreover, they had to have enough space for their avatars to move around without difficulty (figures 10 and 11).
It became necessary to adapt the initial idea to address both the sound and structural issues. That way, instead of using ambient sound, the decision was made to create buttons that, when pressed, would play the soundtrack that corresponds to each space. This solution not only makes it possible for visitors to access the necessary information without using the avatar to move around the space, but also provides greater freedom in terms of space organisation. With this solution, there is no need to limit of the dimensions of the corridors due to sound concerns.
The labyrinthine structure with long corridors was no longer necessary, thereby opening up the possibility of alternatives that could offer visitors a less monotonous experience (eliminating the need to travel through long spaces devoid of visual information). Some of the ideas developed during the sketching phase were considered once again, including the suggestion of opening up a central corridor with access to the rooms hosting the different projects (figure 12).
As for the works on display, there was an effort to keep abreast of the development

Fig. 1. Avatars, Craft World, 2022

Fig. 2. Experimentation phase, Craft World, 2022

of the projects conducted by the other groups to present the most up-to-date versions possible. The projects were continuously documented through photography and the different groups were asked to provide images of their outcomes. These images were then placed in their respective spaces with the corresponding soundtracks.
The arrangement of the images in their respective spaces also creates the opportunity to bring the atmosphere of each corridor closer (through colour choices) to the visual language of each set of images, providing visitors with a more immersive experience and creating greater distinction between the different spaces (figures 13, 14 and 15).

ENTREVISTA DO GRUPO DA RITA E DA INÊS QUEIRÓZ

RITA: O nosso título é saúde mental, arte terapia. Então tema é, é assim, eu fiquei de trabalhar a saúde mental e ela ficou de trabalhar a parte da arte terapia. Eu abordei a questão da loucura, tipo até que ponto é que todos não somos loucos, abordei a questão dasa depressão no ensino superior, cada vez haver mais jovens que têm problemas, o que é mais eu abordei? e sim falei do aspeto, é assim, normalmente na arte há aquela linha ténue que se estabelece entre a arte e a loucura, e até que ponto é que o artista é louco ou não. E nesse sentido, falei sobretudo de exemplos do monche e vicente Van Gogh, porque eles sofriam de perturbações, mas nem todos os artistas são loucos né. Pronto penso que foi isso.

INÊS: A minha parte lá está, foi a saúde mental, foi mais a parte do ensino superior, a ansiedade, o stress, mas também o que o covid trouxe de negativo para esta parte, uma vez que, houve aquelas restrições pronto, nessa parte, também incluí alguns estudos que foram feitos, depois na parte mais já da arte terapia, fiz a ligação que existe entre a arte e a saúde, que originou então a arte terapia, depois liguei com dois artistas o Pollok e If., que são artistas que trabalham, que expressão as suas emoções dessa forma, que não se nota muito, o corpo como instrumento, usar o corpo como pincel vivo, e essas questões todas see achoque foi só.

RITA: O projeto consiste em 4 painéis o primeiro painel já realizamos, por sugestão da professora, iam ser daquelas dimensões, agora as outras 3 seriam um conjunto, tipo colocaríamos...

INÊS: Imagina estas em pé, tens uma tela no chão, que é onde tu tevais expressar através dos movimentos dos teus pés, depois à tua frente tens uma que é para trabalhares com as mãos. Dependendo, de uma forma aleatória, acho eu.

RITA: Nós tínhamos, imagina, temos dois painéis no chão, ou em cima de uma mesa, temos 3 tinas com cores diferentes em cada lado, colocas os sapatos descartáveis, para dar a ideia de pronto, porque ela também relacionou com o covid, tu entras lá e andas a passear com os pezinhos a riscar, depois no terceiro painel está ao alto, tu chegas a essa parte, tiras os pezinhos e colas no último painel. É para ser ao ar livre. No final seria colocar em paralelo os 4 painéis,

INÊS: acaba por ser primeiro os pés e as mãos

RITA: a última parte é quase os vestígios. O plástico por baixo para não sujar a área, ou seja, a pessoa entraria, circularia, saía pelo centro, já limpinha. O ideal, seria giro, era não usarmos as luvas descartáveis que dá a ideia da poluição, mas como também falamos do covid e pedir às pessoas para lavar os pés e as mãos, a ideia é expor tudo e também a ideia de relacionar com o covid, pronto é isso.

Fig. 3. Group 1 interview, 2022

ENTREVISTA DO GRUPO DA JOANA MONTEIRO E DA INÊS SOARES

INÊS: Por acaso ainda não temos título, o tema é feminismo barra sororidade. Já temos uma ideia concreta do que vamos fazer.

JOANA: Vamos meter mulherezinhas a fazer tranças umas às outras, em círculo,

INÊS: A prestarem cuidados umas às outras, sororidade, uma espécie de comunidade, tipo a fazer tranças, em ambiente virtual, vamos por os corpos mais básicos, o mais neutro possível. Corpos neutros, com diferentes tons de pele, diferentes cores de cabelo, cabelo comprido, vai ser uma forma assim bem planeada, vai ser uma complicação porque nós nem sabemos fazer cabelo normal.

JOANA: A professora disse que provavelmente vamos ter de trabalhar com rastas. Não dá para desenhar cabelo.

INÊS: Portanto, basicamente, vai ser uma coisa que remeta a cabelos. Não vai ter som, acho que não. Ainda não pensamos no ambiente, pensamos apenas no círculo.

JOANA: Há um palpite no ar, eu fiz mãos na licenciatura, se calhar vamos trazê-las para criar o ambiente, mas não sabemos muito bem

INÊS: As mãos estão digitalizadas tridimensionalmente.

JOANA: Vamos explorar, é uma instalação. Nós vamos por os avatares a mexer. Eu não iria meter as mulheres nuas assim a fazer uma performance, portanto, é uma instalação em ambiente virtual.

Fig. 4 Group interview 2, 2022

ENTREVISTA AO GRUPO DA KATERYNA E DA CLOTILDE

KATERYNA: É uma simulação, vamos simular as emoções das pessoas que vão entrar numa sala e vão sentir emoções em 5D, dentro da música, o som, o tato, vão ser ouvidos os 5 sentidos. Por exemplo entras e tens areia espalhada no chão, ou seja, é virtual é simulação, emoções e sentidos como o medo, a felicidade, a nostalgia, por exemplo, para o medo pode ser o som de uma trovoada, porque se associa o som, ou por exemplo, pensamos em criar água e depois aparece algo estranho. No caso da nostalgia, a Teresa, por exemplo, teve a ideia da praia sente-se nostálgica o que lhes faz lembrar as pessoas.
Vamos ter vários pontos, várias salinhas, com várias emoções, e depois em cada uma delas vai depender das pessoas aquilo que elas vão sentir, nos não podemos adivinhar já.
Vamos falar também do simulacro, dos ambientes imersivos, das emoções, das instalações e do vídeo maping. Vamos recorrer ao vídeo maping também. Vamos projetar, vamos criar os vídeos e projetar nas paredes, vídeos de água a cair, das nuvens ...

Fig. 5 Group 3 interview, 2022

ENTREVISTA DO GRUPO DO MARCO E DO JOÃO

JOÃO: Aqui a ideia será, era fazer algo atual okay? e hummm, fazer algo atual e centramo-nos muitos na guerra da Ucrânia e da Rússia, okay, foi esta a nossa ideia central, atual e vimos que se enquadrava bem naquilo que queríamos fazer e decidimos avançar com este tema, resumidamente foi isso.

MARCO: Durante a pesquisa nos reparamos que houve uma preocupação por parte dos ucranianos em protegerem a hummm, aquelas obras, aqueles monumentos, que eles tinham lá nas cidade se achamos interessante, porque não só pela ideia pela preocupação deles, mas também pelo aspeto e pela estética que dava aquelas estatuas conforme elas estavam protegidas com sacos de areia e, pronto e então, o que nos vamos fazer é uma instalação que esteticamente seja parecido aquela...

JOÃO: Se tivermos oportunidade vamos concretizar de uma maneira mais simplificada e estamos a pensar não exatamente na forma como está, como é não é, com os sacos a proteger as estatuas estamos a pensar em proteger algo que é nosso, que é pessoal,

MARCO: Ou seja, é não ser uma cópia, mas algo que é próprio. É algo que seja pessoal, a cada um de nós. Pode ser uma fotografia. Por acaso ainda não pensamos nos objetos, mas a ideia era, e se Portugal fosse invadido por outro país, houvesse uma guerra, o que é que eu queria proteger que fosse pessoal, meu? E depois inspiramo-nos pronto, naquela estética que é talvez não utilizar sacos de areia, mas há uma hipótese de utilizar balões, para dar aquele aspeto mais parecido...

JOÃO: Uma situação a pensar

MARCO: Ainda estamos a definir, ainda estamos na parte de investigação.

JOÃO: Aqui se calhar seria uma instalação.

MARCO: A ideia era juntar os objetos, um cada um, não numa escala tão grande como se fosse para apresentar, vamos registar com fotografias.

Fig. 6. Group 4 interview, 2022

ENTREVISTA DO GRUPO DO AFONSO E DA ISABEL

AFONSO: Eu e a sara estamos a fazer um trabalho na área das performances e da pintura colaborativa, portanto nós desenvolvemos uma pintura colaborativa, ou seja, uma pintura feita por mim e pela sara, em contexto de performance. Para tal dividimos o nosso trabalho em duas partes, a sara pesquisou mais sobre a performance eu pesquisei mais sobre as correntes de pintura abstrata, o informalismo, e a aquele tipo de correntes onde a pintura é mais expressiva, para, lá está, depois ser desenvolvida em cotexto de performance. Portanto o nosso trabalho no fundo foi a criação de uma performance, onde se cria um exemplo de pintura colaborativa, mas que tem uma particularidade onde a comunicação é feita de forma diferente, isso também será um pouco a surpresa do nosso trabalho, ou seja, construir um quadro, os dois em contexto de performance, como é que isso aconteceu? Vamos portanto relatar todo esse processo e agora estamos numa fase de construção da memória descritiva e depois do artigo ver a que conclusões chegamos, pronto são esses dois eixos, performance, pintura, colaborativa, neste caso uma pintura a 4 mãos, uma pintura feita por duas pessoas, em contexto de performance num estilo expressivo, nem é bem expressivo, nem é expressionista, agora está me a faltar o termo, mas é assim um estilo de pintura livre, muito gestual, muito natural e muito espontânea, pronto, é mais ou menos isso.

Fig. 7. Group 5 interview, 2022

ENTREVISTA DO GRUPO DO ABEL E DA ANA

ABEL: O meu trabalho e da teresa é sobre aaaaa, a arte ,digamos assim, para daltónicos, então o que nos estamos a trabalhar é nos ambientes virtuais, criar uma espécie de museu de color ad, foi o, depois o que nos usamos para representar as obras de arte, então aí é que a ideia é de nós criarmos , alguns objetos, quadros a representar obras de arte, enfim, tudo isso, em que tenha a cor pronto do objeto, mas também os símbolos e identificados com os símbolos correspondestes do color ad, para, prontos, as pessoas daltónicas, de alguma forma, conseguir perceber ou ter uma melhor perceção, um interação mais realista, digamos assim, da obra de arte.
No fundo é isso o que temos andado a fazer tem sido no ambiente virtual, pronto que, no ipverso, temos criado já algumas coisas, digamos assim, museu, obras de arte, pronto e vamos acrescentar mais alguma coisa, mas o objetivo no fundo é esse.

Fig. 8. Group 6 interview, 2022

LILIANA: O título do nosso trabalho é "Dizer não à Violência Doméstica". A Teresa abordou a violência doméstica, mas as consequências que tem nas crianças e eu abordei mais a violência doméstica e as consequências para a mulher. Obviamente que isto está diretamente ligado, não é? Aaaahm em relação ao que nós fizemos, nós vamos fazer uma instalação, isto partiu de um conceito precisamente da ponte dos cadeados, ou seja, da ponte do amor, mas que muitas vezes não é a ponte do amor propriamente dito, não é? É a ponte da infelicidade e a nossa ideia partiu um bocadinho daí, em recolher, a ideia inicial era recolher mesmo testemunhos verídicos, mas não havia tempo para isso então pedimos a colaboração dos nossos colegas para algum contributo como forma de dizer não precisamente à violência doméstica.

JOANA: A Sara já disse tudo, nós, como nosso projeto quisemos fazer aqui um oposto, não é? Porque colocamos mesmo grades de prisão, porque as mulheres que sofrem deste tipo de violência basicamente estão presas, mas com fitas. Já há algumas assim, por exemplo a de Aveiro já é só com fitas para os cadeados não danificarem a ponte, que ela é de madeira. E nós aqui fizemos o inverso, lá a ponte até se chama Ponte do Amor e da Amizade, tem mensagens sobre o amor e a amizade, e nós aqui fizemos o oposto ligando à violência, as grades da violência. Numa situação ideal seria numa escala maior, com testemunhos reais. O roxo das fitas tem significado porque é a cor geralmente associada à violência doméstica, o lilás. Também há um mês específico, que é o mês de agosto.

LILIANA: Uma ponte ou uma instalação, umas grades numa escala maior e as mulheres iriam lá colocar o seu testemunho, é uma instalação.

Fig. 9. Group 7 interview, 2022

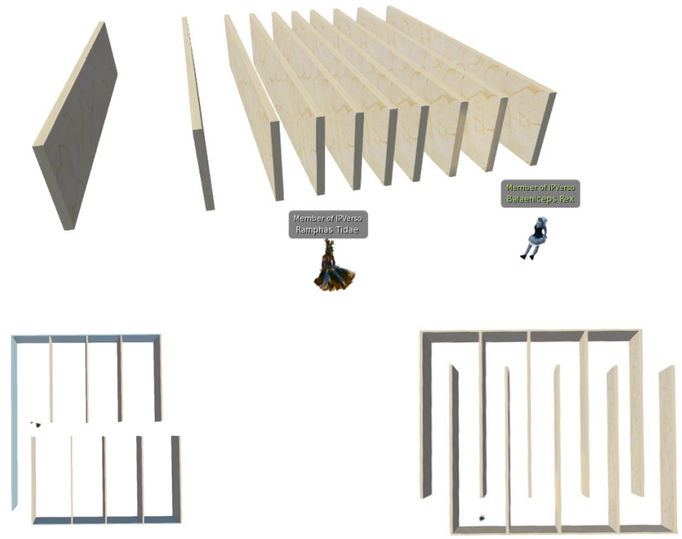

Fig. 10, 11 e 12 Construction of the corridors, Craft World, 2022

2.4. Testing/simulation and evaluation

Once the structure was completed, the images were arranged and the sound was added, the simulation/testing of the results and the reflection on how the audience would interact with the installation could begin. Any resulting problems were promptly addressed. One of the main challenges involved the soundtracks because of the time lag between their activation and the corresponding result. To address this problem, a decision was made to inform visitors of this aspect by placing instructions at the entrance to the space. During a simulation of a complete visit to the space using the avatars, it was found that the current layout facilitates circulation and provides visitors with greater freedom of movement. Visitors do not have to visit the rooms in a specific order.

Fig. 13 Current version, Craft World, 2023

The decision to seek aesthetic uniformity between the images and the rooms/corridors where they are displayed contributes to improving readability and establishes a clear distinction between the different spaces that would otherwise all look the same, except for the images placed inside each of those rooms.
Some aspects of the concept that was

initially envisioned had to be rethought and some of the ideas had to be simplified. However, the result of the adaptations introduced was in line with the objectives set for the project. The solution of conducting the interviews and their subsequent appropriation was the main change made to the initial idea, and ended up playing a central role in the project.
Due to time constraints, it was not possible to obtain the final version of all the projects. Therefore, the soundtracks and the appropriation of the ideas/concepts became the main means of achieving this appropriative action, which, when combined with the collected images, gives meaning to the final work.
In terms of formal result, the space features a corridor that serves as the entrance to the installation. The viewer has immediate access to introductory information about the project - title, authors and instructions - and then proceeds down the main corridor, which leads to seven different spaces each housing three images from each project, collected by our group, along with the corresponding interview soundtrack. The differentiation of the spaces is achieved through the colour of the walls, carefully selected to match the colour palette of the images. There is also an exit corridor ensuring that visitors do not have to return to the entrance of the installation.

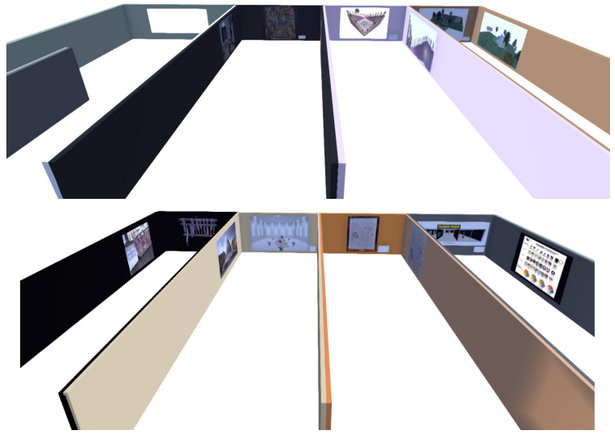

Fig. 14 e 15 Current version, Craft World, 2023

3. Conclusions

Authentic Praise emerges as the outcome of an exploration into the meanings of appropriation, copying or plagiarism in today's context. The project delves into how these concepts are perceived and the role digital technologies can play in this process. In addition to authorship and copyright ownership, the aim was also to create room for thinking about matters of truth: are any of the versions true? What dictates which one should be the official one and therefore remembered.
It is also crucial to understand how this type of practice is received, both by the public and by the authors whose artwork was removed from their original context and used in another version.
Despite the deviation from the initial idea, the results achieved successfully convey the project's intentions, allowing for the exploration and experimentation of appropriative action through the possibilities provided by existing digital platforms and virtual environments.
The main challenge that had to be overcome was the collection of data from the other projects under development, in order to obtain the most up-to-date version possible without compromising the element of confidentiality required.
Finally, when considering the possibility of continuing the research, one of the aspects identified involved the need to conduct a more in-depth study of virtual environments and of what is being or could be done within this context while addressing the proposed topics, since it opens up a wide range of hypotheses that go beyond the limits of physical reality.

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The five senses

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Abstract
This article aims to critically examine how virtual environments may stimulate the human sensory system. To this end, the study combines an exploration of sensory foundations (especially sight and hearing) with the sensation of immersion, grounded in Baudrillard's concept of simulacra and simulation, within the framework of an installation built under a collaborative virtual environment paradigm. According to the analysis conducted, a project was implemented to develop a virtual environment representing an island that will provide users with experiences and situations closely resembling reality. The Craft World platform was employed to create this environment, and different software tools (such as Blender, Maya, Photoshop, etc.) were utilised for object and artifact modelling and texturing. This study allowed us to assess the potential of collaborative methodologies offered by virtual environments, as well as some of the limitations encountered in the exploration of sensory perceptions.

Keywords: Collaborative Virtual Environments, Installation, Senses, Simulacrum.

Introduction
The present study was conducted as part of a group project focused on the creation of a virtual environment. To achieve this goal, we chose to recreate an environment that the audience could explore and engage with using the five human senses, which would act as sensory activators. Consequently, we had to face the challenge posed by the following question: “how can we effectively stimulate the senses of a human being within a virtual environment”?
Once we defined the question, we proceeded to break it down into more specific ones that helped outline the study. These new questions included: “what are virtual environments”? “How can we replicate real-life elements in a virtual environment in order to stimulate the human senses”? “What are the most significant characteristics of the five human senses, and what significance do they hold”? And finally,” which senses can be stimulated”?
We believed that this work would enable us to efficiently streamline the conduction of our research study and assist us in the construction of the prototype for the final product. The primary objective of this project was, therefore, to create a virtual environment, presented in the form of an installation, that the audience could explore in a way that could activate their senses.
In the initial part of the chapter, we will introduce the theoretical framework, which consists of a comprehensive investigation conducted to consolidate and ensure the sustainability of ideas and decisions deemed crucial to the development of the prototype. This section will delve into concepts like the five human senses, simulacra and simulation, as well as virtual/immersive environments. Following this discussion, we will address various issues intrinsic to the Metaverse and OpenSimulator platforms. Additionally, we will focus on defining the nature of artistic installations and exploring the creative possibilities they offer.
The second part of the chapter encompasses the process that led to the execution of the project, starting with the discussion of ideas and their subsequent development. The third part delves into the final product, describing both its formal and conceptual characteristics. Finally, a response to the initial problem will be provided, and the research limitations will also be addressed, taking into account the degree of fulfilment of the objectives that were initially set.

1. Framework
1.1. The five human senses
Human beings are consistently exposed to diverse situations that engage their senses. According to Schiffman (2005), "the most frequently used senses at work are touch, sight, hearing, smell, and taste" (cit. by Valente, 2013, p.22). However, sight is one of the most important senses as "it is the predominant sensory system" (Schiffman, 2005, p.34). The author explains that the physical stimulus for visual perception is light. Our eyes capture this light and convert it into information that is subsequently transmitted to the brain, where stimuli are decoded into an image (Schiffman, 2005, pp.34-44).
As for the auditory system, Schiffman asserts that in everyday life "the sounds we hear are created by a form of mechanical energy [...] generally transmitted through the air and caused by the vibration of matter" (2005, p.231). To successfully reach the brain, these sound waves are captured and converted into information. Another

characteristic of the auditory system is its capacity to identify the spatial location of the sound wave emission without having to confirm that location through sight, thus eliminating the need to be in close proximity to the object producing the sound.
The sense of touch is experienced through the skin, which according to Schiffman (2005) "is seen as both a sensory organ and a protective organ" (p.300). The sensation produced by the skin is referred to as cutaneous sensitivity, and it is capable of identifying three distinctive qualities: pressure of touch, temperature and pain. These qualities can be perceived differently, as "the surface of the skin is not uniformly sensitive to cutaneous stimulation" (p.301).
The sense of smell is triggered by external chemical factors that can be close or distant, and plays an important role in various human life functions (Schiffman, 2005, p.342). It is worth noting that the olfactory system, through the sense of smell, enables the creation of episodic scents that are "associated with real-life experiences" (Schiffman, 2005, p.351). The scents perceived by human beings at different moments can stimulate memory, prompting them to recall a specific place or an event they have experienced before by associating it with a particular smell. "Odours can be associated with events, serving as powerful cues of memory" (Schiffman, 2005, p.352).
We can also affirm that the sense of taste "is stimulated through chemical substances" (Valente, 2013, p.145). Taste is interconnected with other sensory stimuli because "the texture of meat, the sound of breaking cereal, the temperature of coffee, or the colour of a candy can all play a part in experiences typically credited to taste" (Valente, 2013, p.146). However, if one of these senses fails, taste alone will be insufficient for individuals to perceive and decode the object.
In summary, we can assert that the "senses are stimulated by the body's sensory perception. As this perception forms neural associations, it retrieves memories and brings emotions with it" (Oliveira & Braga, 2013, p.4). These sensations and memories are of utmost importance, as they enable conscious reactions in human beings.
In addition to these scientific considerations, the five senses can manifest in the form of synaesthesia. Frank Popper's (2007) “Synaesthesia” thesis suggests a certain interplay of sensory foundations that induces the concept of immersion or a kind of overwhelming assault on the spectators' central nervous system, compelling them to surrender due to excessive stimulation. According to Presa (2008), "Synaesthesia consists [...] in the ability to hear colours, taste shapes, or any other combination that is challenging for non-synesthetes to imagine" (p.12). This stimulation can be effectively achieved through art, defined as "the ability to create, express or convey sensations" (Presa, 2008, p.84). However, the connection between synaesthesia and technologies is stronger, given the current state of technological development that enables the creation of a great variety of forms, such as virtual installations and digital art, among others, that can be used to improve interaction with the viewer. "Artists can now use a wide variety of sensors and physical interfaces to craft their works, allowing for new and different forms of interaction between the user and the artistic work" (Presa, 2008, p.2). In other words, through these works, artists can achieve a more profound stimulation of the senses that was not possible to attain with traditional artistic mediums.

1.2. Installation

The term “installation” was first introduced in magazines and catalogues as a way to encompass different three-dimensional propositions. Essentially, it refers to the creation of physical spaces around the community (Tedesco, 2007, p.19).
According to Tedesco (2007), the actions that illustrate the interventions created by artists in a specific space have been assigned different names: “environment”, or “assemblage”, among others. The author states that, according to Oxley and Petry (1994), the term “environment” was established during the 1976 Venice Biennale, while “assemblage” described works in which "the artist puts together different materials to create a space [...] At that time, “installation” merely indicated how an exhibition had been arranged" (Tedesco, 2007, pp.20-21).
However, according to Fiz (1986), there is a distinction between “environment” and “assemblage” primarily based on dimensions. While in an assemblage the audience moves around something, i.e., around the objects that form the composition, in an environment, the audience can enter the artwork and move within it. Therefore, an environment is composed of objects, pieces, and spaces where the audience interacts with the work. This interaction with the artwork does not rely merely on the sense of sight, but mobilises the totality of the senses. Viewers can thus articulate their senses and experience the work through their memory (Tedesco, 2007, p.20).
According to the author, these two terminologies, “environment” and “assemblage” became entrenched in the art circuit and are considered a motivating factor. However, there is no precise explanation regarding how these terms were replaced by the term “installation” (Tedesco, 2007, p.21).

> El “assemblage” se expansiona hasta llenar el espácio. Su diferencia essencial respecto al “ambiente” se debe unicamente a sus dimensiones: mientras em el “ensamblado” andamos alrededor de, em el “ambiente” penetramos, estamos no movendo dentro. De este modo, la transición entre ambos tiene lugar gracias a la extensión, a la ocupación completa del espácio actual (Fiz, 1986, p.175).

In summary, it can be asserted that the installation ultimately transforms into a kind of simulation, a simulacrum of a particular environment or situation.

1.3. Simulacrum and its role in society

In contemporary society, the simulacrum often functions as a powerful tool to control human behaviour and emotions (Sales, 2004, p.6).
It could be argued that the simulacrum is a replica of the real and, in a way, diminishes realty as it takes its place.
Baudrillard (1981) asserts that "simulation questions the difference between the 'true' and the 'false', the 'real' and the 'imaginary'" (pp.9-10). From his perspective, the world is a "real without origin or reality" (p.8), a hyper-real context where only the simulacrum exists. The author claims that the simulacrum can become so real that we come to perceive it as reality, detaching ourselves completely from the real world. In other words, we interpret the simulacrum as real by embracing the signs it presents, thereby diminishing the value of reality.
The simulacrum, according to Sales (2004), is a "good copy, the perfect copy, one that, despite its similarity, cannot help but reveal its imperfection in comparison to the original" (p.4).
Nowadays, the modelling of human behaviour is achieved through propaganda, with the simulacrum serving as its main "weapon". In other words, the way the simulacrum is used in propaganda enables the manipulation of human behaviour. Therefore, its use becomes increasingly

important, because, as stated by Freitas (2013), "Images shape the world" (p.334). We are constantly flooded with images perceived through the sense of sight and these pictures have already become a significant part of our lives, turning our existence into an image. Images have replaced our reality and are used to manipulate us. This was precisely the objective of Russian propaganda, particularly evident in its 1954 posters. Through the sense of sight (creating an image), the aim of these posters was to instil the idea among the Ukrainian people that Russians and Ukrainians are brethren, and that this camaraderie has endured for many years. However, this is a distorted vision of reality. The difference between the two peoples is evident as "tensions between Russia and Ukraine are rooted in civilisational and ideological issues, intrinsically linked to their national identities. Ukraine is deeply entwined with Russia, especially from a psychological point of view, and is seen as a vital strategic point" (Aparecido & Aguilar, 2022, p.16).
Therefore, as Edler (2011) suggests, we can infer that Russia seeks, through propagandist images, to change the feelings of the Ukrainian people, inducing new behavioural patterns and striving to instil in them feelings of acceptance towards the Russian people, who are portrayed as kin. However, in reality, there is no such connection between the two peoples "instead of being connected to Russia, the Ukrainian nation inhabited other regions, where it enjoyed a significant degree of autonomy" (p.12).

1.4. Creative Collaborative Virtual Environments

Technological advancements have enabled the creation of different "artificial" worlds, simulations of spaces commonly known as Collaborative Virtual Environments. These environments allow users to create different settings based on the real world, where visual and auditory elements are used to evoke sensations, with a particular emphasis on the senses of sight and hearing. There are several examples of platforms dedicated to creating these environments, such as OpenSimulator, Second Life and many others, that enable interaction between people through the use of avatars. These avatars ultimately serve as simulations, as they create virtual illusions that can be perceived as reality. These worlds can simulate various risk situations or everyday life scenarios, ranging from disaster simulations to a visit to a museum, among many others. Virtual museums provide an opportunity to visit and explore exhibitions without leaving the comfort of our home, irrespective of its geographical location. All that is required is a computer with Internet access.
The Metaverse is a collection of different interconnected virtual worlds filled with imaginative content that has become increasingly popular over the years. In these worlds, "people use their digital avatars to carry out the most diverse activities" (Pironti & Keppen, 2021, p.58). These platforms allow users to socialise, travel, play games, work, and engage in many other activities.
SecondLife is a simulated world, a "3D social environment that allows high levels of interaction, thanks to its communication potential. It also favours virtual collaboration and content creation" (Oliveira, 2008, p. 4). It enables users to explore the world and use it to generate business opportunities, educational contexts, or to create works of art, art installations, and much more.
The “Somewere” art installation, designed in 2021 within Second Life, is an installation created in a virtual environment that explores the different possibilities offered by this environment.
OpenSimulator is an open-source server designed to allow the creation of customised virtual worlds. It enables users to explore, interact with and/or modify those worlds.

OpenSimulator was created to foster the "development of innovative resources for virtual environments and the Metaverse in general" (Santos, 2019, p.35), i.e., the server was developed to enable new experiences and resources within that virtual environment.

1.5. Immersive/virtual environments

"Virtual environments can take various forms They can represent buildings or objects such as cars and characters (avatars) [...] In other cases, they may exist without any reference to the real world, constituting an abstract model" (Tori & Kirner, 2006, p.10).
In turn, immersive environments, just like collaborative virtual environments, can be regarded as another category of simulation that can be used to shape human behaviour through the use of the different senses. As an example, we can highlight the immersive “Living Van Gogh” environment. Created from the works of Van Gogh, this environment uses video mapping to envelop the viewer in a unique ambience, inviting him to "stroll" through different rooms where the artist’s paintings are showcased in constant motion. This immersive experience highlights the distinctive characteristics of Van Gogh's artwork, such as colour, brushstrokes and the intricate details of the paintings, among others.
"Immersive and participatory environments [...] are spaces that use computer systems to promote a perceptual illusion and stimulate the visitor's senses through multimedia devices" (Araújo & Rondon, 2005, p.1). These environments are not simulacra but simulations, since within them, we can perceive the difference between the real and the simulated.
Immersive environments enable "people's senses and capacities to be enhanced in intensity, time and space" (Tori & Kirner, 2006, p.3). These environments provide users with the possibility to act or interact in various imaginary situations. This capacity for interaction contributes to a richer and more natural experience of the users. In other words, it allows the user to naturally inhabit a virtual world and act within it as if they were in the real world (Tori & Kirner, 2006, p.6).
The 5,000 m2 immersive installation that took place in Rio de Janeiro Olympic Park, in 2019, created a simulation of the Earth, providing the public with the opportunity to see what it was like in its early stages. Various events were simulated in this installation, from volcanic eruptions to the flourishing of a wide array of plants and forests.
On a different level, immersive virtual reality transports the user "to the realm of the application, through multisensory devices that capture their movements and behaviour and react to them [...] inducing a sense of presence within the virtual world" (Tori & Kirner, 2006, p.8). These environments are illusory and are designed to stimulate human senses, such as sight and hearing, while providing freedom for exploration.

2. 2. Execution process

2.1. Creative proposals

Many of the concerns outlined earlier were carefully addressed during the development of our project. We started by defining the theme to be explored, which led to a cascade of ideas that were considered both interesting and relevant to the purpose of the work. The outlined project involved the creation of an environment capable of

triggering a set of stimuli and whose aim was to engage the viewer's senses. An installation was subsequently created in the form of an island located within Craft World. The environment simulates reality, and its exploration allows individuals to experience moments that mirror reality. Following this brainstorming process, visual references were investigated for inspiration. This step was crucial to help solidify the project concept. Once we defined the work typology (creating a space in a virtual environment), we started to explore the platform and experiment with the potentialities it offers.

2.2. Experimentation

Initially, we faced some difficulties in accessing Craft World, particularly the IPVerso group, but this issue was promptly resolved and we could finally start our experiments/tests. These experiments were conducted to ensure that each member of the group could understand the possibilities of working in this type of environment. In other words, it was crucial for everyone involved to understand how the process of creating and modelling objects functions in this environment. Fortunately, the challenges encountered were not overly significant in the end, since the 3D modelling part proved to be quite similar to that of other modelling programmes, such as Blender, Maya, or Unity.

It is worth noting that, beyond experimenting with the modelling capabilities of this environment, we also explored the environment itself and the potentialities it offers. This exploration included a visit to the Craft World shop where we purchased some elements that proved useful in creating the final product.

2.3. Execution

During the execution stage of the final work, each team member, having explored the environment, began modelling and creating their respective final project. This was a collaborative creative process, as the platform allowed constant dialogue and discussion among group members about various issues related to real-time collaborative work. With this functionality, there was no need to schedule different meetings.

Initially, our aim was to create a building with multiple rooms, each one dedicated to explore a specific sensory base, but after several tests and discussions among the group members, it became evident that the coherent spatial interconnection would be lost. Consequently, we decided to abandon the idea of the building. As an alternative, we opted to build a unique "open-air" space that would encompass the various sensory experiences, where the transitions between the different sensory sections would be almost imperceptible. The barriers between the various sections would be made out of trees, rocks, or water, creating an island-like setting.

To initiate the construction process, several fences were purchased from the Craft Store. Those were pre-made fences, which greatly simplified our work. In the initial stage, all the tree fences were made of the same type of tree. As a consequence, the outcome fell short of expectations. A few more experiments were conducted to enhance both the aesthetic and realistic aspects, and some adjustments were made to the texture of the tree fences to create the illusion that they were made from different tree species.

To complete the environment, other characteristic elements of the chosen spaces were created. This included water for the beach, uneven ground for the countryside, sand, mountains, and logs that would later be scattered across the fields. At first, the intention was to create all these elements directly within Craft World, but it soon became evident that modelling within this environment would not provide the desired level of detail, as the elements created were too flat and the desired unevenness could not be achieved. To solve this problem, we turned to another modelling programme, Blender, which offered greater freedom, and allowed us to work on the desired details, namely the unevenness of the terrain (field or beach) and the mountains that, when created in Craft World, were mere basic triangular prisms.

The objects we created were subsequently transported to the Craft World environment. Uploading files conceived in other software allowed us to impart a distinctive look to the environments, incorporating more details. The use of textures also helped to transform the objects, bringing them closer to their real-world counterparts.

The water feature was created directly within the Craft World environment. We conceived a rectangle using the available water texture and we added a pre-designed movement script to evoke a sense of flow. A transparency effect was also added to enhance realism.

When the modelling was done, the recreated environments were progressively filled with characteristic element. For example, to recreate an eerie and spooky atmosphere, leafless trees, stormy clouds and storm sounds were incorporated into the darkest forest areas.

2.4. Testing and/or simulation and evaluation

During the testing phase, several problems were identified and promptly addressed before transporting the island to the exhibition site.

During the final stage, we found out that the landmark was set in the wrong location. Since it was created before the final product was transported to the exhibition space, the teleportation point ended up in the mountain area. This miscalculation led to situations where the visitors' avatars were constantly getting stuck. To solve this problem, another landmark was created in the intended location.

Another issue that required attention was the absence of "walls" on the island, causing constant falls among the visitors' avatars. To prevent this from happening, a transparent box was placed around the island to advert those falls.

3. Final product

The entire work process culminated in the creation of the final product representing an island where visitors are able to explore different places and sensations: the warm and sunny beach, the gloomy and rainy forest, and the calm and serene countryside. To achieve a more realistic representation of these places, each of them includes sounds and other elements designed to stimulate the human senses. The island contains a beach/lagoon area featuring moving water, the sound of ocean waves, sand, palm trees, and a waterfall with flowing water accompanied by its characteristic sound.

The waterfall functions as a border that provides a harmonious separation between the beach and the countryside, creating a smooth transition between these spaces. The forest area of the island is divided into three parts: the field, where the terrain is flatter and with fewer obstacles, and where visitors can appreciate the sound of birds singing; the forest with its mountains, trees, bushes, and the sound of characteristic animals; and the dark forest, a darker zone that contains bare trees, dark clouds, rain, and the sound of thunder.

The navigable space of the island, when explored by visitors, allows the stimulation of the senses, particularly sight and hearing, enabling visitors to experience real-life situations within a virtual environment.

Conclusions

The development of this project highlighted the importance of the entire process and each of its associated stages, a journey marked by the maturation of ideas, research, planning, experimentation, testing, overcoming obstacles, setbacks and advancements until the realisation of the desired final product. The completion of this work made us realise how the concepts explored in our research can be effectively applied within a virtual environment to create a navigable space that stimulates the human senses.

Various challenges emerged throughout the process, some of which were mentioned earlier. The most challenging one was the task of recreating environments that are capable of stimulating all five sensory bases. In this sense, we realised that fully representing sensory reality in a virtual space was not feasible, and that it was impossible for visitors to experience smell, taste or even touch. We are aware that part of sensory perception operates through associations with memories from real-life experiences, so the ambience generated in the project was designed to provide a combination of stimuli and associations that complement each other to enhance the visual and auditory components. Another aspect worth mentioning is that the avatars are unable to perceive the direction of the sounds. While they can sense proximity and distance, they lack the capacity to discern lateral positioning.

The group work carried out within this environment proved to be a valuable contribution to collaborative work. The Craft World platform allowed group members to work simultaneously in a given space, even when geographically dispersed. This working methodology promoted the exchange of ideas and options, as well as the swift resolution of problems that kept emerging during the development of the project, since all of those issues were discussed and addressed in real time.

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2nd IPVerso Conference Cycle

Society, Education and Culture in the Digital Age

During this 2nd Conference Cycle, a group of esteemed Portuguese and Italian personalities, who have dedicated themselves to the study of the digital age, were warmly welcomed to the IPVerso.
We discussed their insights and engaged in discussions about the impact of digitalisation on society, education and culture. This event took place on May 26th, 2023, and was conducted entirely in a virtual format within the IPVerso simulator.
Pedro Coutinho reflected on the transcendence of the paradigm of disciplinary regimes and the abrupt transition into a new infocracy of transparency, privatisation, and manipulation of public space. He considered that open-source digital spaces like the IPVerso might stand as one of the last bastions for a free public sphere.
Leonel Morgado explained the essence and characteristics of immersive learning environments and their practical uses.
He explored the theory of immersion, illustrating such theory with a series of case examples.
Rosanna Galvani introduced her project, the Metaverse Museum, of which she is both the founder and curator. This is a virtual institution that exists within the same grid as the IPVerso, the Craft World, featuring exclusive content and collections specifically designed for the Metaverse environment.
Still within the Craft World grid, Lorenza Colicigno presented her project titled City of Women. This project hosts the literary creations of women, primarily poets, from different historical period, housed in ten virtual buildings.
Finally, we welcomed Rui Raposo, who addressed the challenges that arise in the context of generative artificial intelligence concerning creativity and originality in artistic creation. Through AI, it is possible to generate artefacts that are deemed creative but that raise questions about the role of the artist in the creation of these works, and their respective author rights.

Objectives
•To reflect on the impact of the digital age on socialisation and the social fabric;
•To understand the essence of immersive learning environments and the importance of such environments;
•To learn about the project Metaverse Museum project;
•To get acquainted with the City of Women project;
•To understand how curation projects function within the Metaverse;
•To reflect on creativity and originality in artistic creation within the context of generative artificial intelligence.

Programme
•Opening session (Catarina Carneiro de Sousa, PT)
•Message from the President of ESEV
•Impacts of the digital age on socialisation and social fabric - exclusions, dependencies, democracies (Pedro Coutinho, PT)
•Immersive Learning Environments (Leonel Morgado, PT)
•Break
•The Metaverse Museum project (Rosanna Galvani, IT)
•The City of Women project (Lorenza Colicigno, IT)
•The challenges of creativity and originality in artistic creation in the context of generative artificial intelligence (Rui Raposo, PT)
•Q&A session
•Closing session (Catarina Carneiro de Sousa, PT)

A Metaverse Art Museum

Rosanna Galvani, fundadora e proprietária do Museo del Metaverso

Abstract
The Metaverse Museum (Museo del Metaverso), is a virtual institution that replicates the characteristics of an actual museum but features exclusive content and collections specifically designed for the Metaverse environment.
This innovative project combines elements of virtual reality, interactive experiences, and worldwide accessibility, provides visitors with access to virtual exhibitions, art galleries, digital replicas of artworks and cultural objects, learning labs, event venues, and much more.
The Metaverse Museum was created in Second Life to exalt the artistic content that exists in this virtual world. It was founded on December 5, 2007.
The Museo del Metaverso has enjoyed considerable success over the years, offering permanent and temporary exhibitions. The museum has actively participated in many valuable art and cultural events in the physical world, it has played a supportive role for many students from Fine Arts Academies who were coming to Second Life to prepare their theses, and has collaborated closely with the Academy of Fine Arts of Macerata, with its participation in numerous meetings as a way to introduce the concept of the Metaverse Museum, which was quite innovative for its time.
Today, the primary Metaverse Museum is located in Craft World (a virtual world based on the OpenSimulator platform) and whose prime objectives are to preserve and showcase artworks that are entirely digital, replicas of physical-world artworks, and, more recently, images generated using programmes based on Artificial Intelligence. The Metaverse Museum continues to operate across various virtual platforms, such as Second Life, Craft World, and Spatial and to organize exhibitions, host lectures, and discussions.
This chapter explores the museum's history, its achievements, the challenges it has had to face, and future developments to be made.

Keywords: MdM, digital art, virtual art, metaverse

Introduction
The Metaverse Museum (MdM), is a virtual institution created to replicate a physical museum. It was created it in the well-known virtual world called Second Life back in December 2007, inspired by a lecture delivered by Mario Gerosa (the author of Mondi virtuali, in 2006, Second Life, in 2007, and Rinascimento virtuale, in 2008). Then, its founder conducted a thorough exploration of all the artistic regions she could find within Second Life.
In 2008, the Museum moved to an OpenSimulator-based virtual world, and by 2010, it had found its permanent home within Craft World (OpenSim).
The Museum's primary objective is to preserve and showcase exclusively digital pieces of art, replicas of physical artworks, and more recently, images generated by programmes using Artificial Intelligence technology.
It continues to operate across different platforms, like Second Life, Craft World, and Spatial, and offers exhibitions, lectures, and discussions.
The museum is a space in constant evolution. Much more than a space used merely to preserve and display works of art, it functions as a living and fertile hub for ideas, where people are given the opportunity to experiment and to share experiences with other creators working in the virtual world and whose work encompasses various creative fields like art, architecture, music, theatre, cinema, and literature.
It is indeed a fascinating but complex endeavour that involves a wide range of challenges that have to be addressed, including improving accessibility, ensuring the preservation of digital content, increasing artist and visitor engagement, and integrating emerging technologies like artificial intelligence and extended augmented reality.
The Metaverse Museum project encompasses artistic and cultural content of significant value for Schools and Art academies. Its creator's goals are to open the museum's doors to all forms of art, seeking collaborations with public agencies, museums and private galleries.

1. Framework
The Metaverse Museum is an open place. The concept is in full accordance with the new definition of the term "Museum" approved by the ICOM Executive Board and adopted in Prague on August 24, 2022, during the 26th General Conference of the International Council of Museums (ICOM). This is a definition that applies to museums from all over the world:

> A museum is a not-for-profit, permanent institution in the service of society that researches, collects, conserves, interprets, and exhibits tangible and intangible heritage. Open to the public, accessible, and inclusive, museums foster diversity and sustainability. They operate and communicate ethically, professionally, and with the participation of communities, offering varied experiences for education, enjoyment, reflection, and knowledge sharing. (ICOM, 2022)

The Metaverse Museum is a virtual institution that replicates a real-world museum, featuring exclusive content and collections designed specifically for the Metaverse environment. It combines virtual reality, interactivity, and global accessibility, providing virtual exhibitions, art galleries, digital replicas of artworks and cultural objects, learning labs, event venues, and much more. The museum was founded on December 5, 2007, in Second Life, the well-known virtual world that was

at its peak of success at the time. In 2008, the Museum moved to a new open-source platform based on OpenSimulator (OpenSim), called Cyberlandia. Then, in 2010, it found its permanent home within the OpenSim virtual world Craft World [1] .
The creation of the Museum would not have seen the light if it weren't for the collaborative efforts of inspired 3D builders: Zer Sewell (Second Life nickname), who created the original structure in Second Life; Nicola Reinerman (SL nickname), responsible for designing two versions of the Museum in Second Life and the initial versions in OpenSimulator (first in Cyberlandia and later in Craft-world); Elif Ayiter (aka Alpha Auer), who was responsible for the renovation of the Museum in 2015; and lastly, László Ördögh Diabolus (aka Velazquez Bonetto), the founder of C.A.R.P. (Cybernetic Art Research Project) in Second Life, who is currently working on new premises set to be inaugurated in 2023.
The significance and growing popularity of the Metaverse lies in its capacity to provide new modes of interaction, accessibility, and cultural participation, overcoming existing physical and geographical boundaries. However, the MdM has to face certain challenges, including the digital divide, the preservation of digital content, and the fact that it lacks the physical experience of the traditional museums. To address these issues, a sheer amount of work is required to reduce the digital divide, develop strategies for preserving digital content, and ensure equitable and inclusive access. Despite all these challenges, the Metaverse Museum offers several advantages, like global accessibility, personalized experiences, interactivity, and user engagement.

2. History

In 2007, it was still quite difficult to fully grasp the extent of the artistic and cultural phenomenon that was taking place within this 3D environment. That summer, MdM founder was first introduced to the creative side of this virtual world during a lecture by Mario Gerosa, held at the at unAcademy, Giuseppe Granieri's Unconventional Academy of Digital Culture (back then an active cultural region in Second Life). This lecture opened up horizons hitherto unknown.
From that moment onward, Rosana Galnavi embarked on a “mad and desperate study” (as poet G. Leopardy would have put it) of the artistic and cultural activities present in Second Life. This journey brought her into contact with some of the best creative experiences worldwide.
She started with Locusolus, Gazira Babeli's archive, and then delved into Odyssey Art&Performance and its related lands, Second Front and Second Louvre. Eventually, the search for experimentation in architecture led her to DanCoyote Antonelli's sim and several other stunning islands, where creativity had followed diverse paths, with outstanding outcomes (Utopia, Black Swan, The Future, The Port, Ville Spatiale, Reflexive Architectures, among others).
After this almost frenetic wandering, Rosana Galvani came to realize that art and architecture are the essence of Second Life and that if she were to conceive a cultural centre, the creation of an appropriate digital space would begin with architectural design. In Second Life, architecture is a qualifying element, as it is the form that provides recognition to a project and enhances its content.
The name "Metaverse Museum" or Museo del Metaverso (MdM) emerged during a brainstorming session within the LiberaMente ("FreeMind") group. This choice was based on the matured conviction that a distinct cultural experience existed within Second Life, even within the Italian community. If she were to create an imaginary space immersed in Second Life, serving both as a container and palimpsest for creative and performing experiments, Rosana Galvani needed to consider this

1 https://www.craft-world.org/page/en/home.php

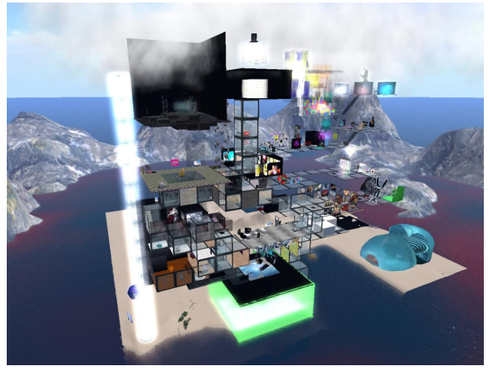

Fig. 1 First museum in Second Life (2008)

newly-discovered phenomenon and take into account the existing artistic and cultural vitality.
As a result, a museum complex was built (see Fig. 1) composed of three key elements: the gallery, the socializing area, and the archive. A plan was developed to outline the guiding principles that will govern the Metaverse Museum.
During this period, a watercolourist and an urban photographer were invited to display their work as part of the several exhibitions that were taking place in the 3D environment and, a few months after the museum's opening, several digital artists were called to exhibit their creations.
The Museo del Metaverso soon became a hub where innovative ideas related to art and culture could be cultivated. Between 2007 and 2011, we participated in several initiatives that were organized by Italian associations and institutions and were operating in the physical world. Rinascimento Virtuale in Florence, curated by Mario Gerosa, Futuroma and Ars in Ara in Rome, Innovation Festival in Milan, Viareggio Art Project in Viareggio (Italy), and Open Garden in Fogliano (Latina, Italy) are some of those events.
This clearly shows that the Metaverse Museum has always had a "phygital" (physical+digital) vocation, i.e., a propensity to create events concurrently in both the Metaverse and the physical world.
Over time, her sensibility prompted the MdM founder to leave behind the purist conception of the early years. She became more open to a new way of conceiving the Metaverse Museum and, as a consequence, the virtual museum. The time had come for MdM to open its doors to artists of all kinds and to embrace a more open notion of the virtual museum, one that could be inclusive

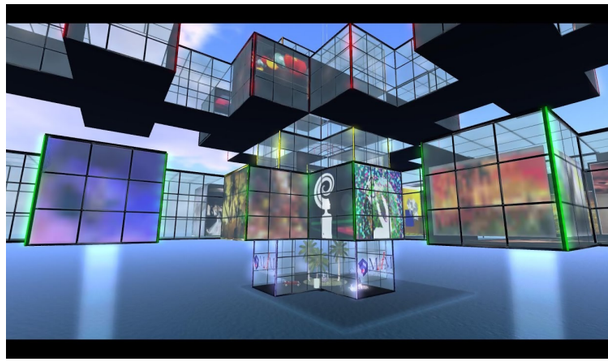

Fig. 2 MdM in Craft World (2010)

Fig. 3 MdM in Craft World (2010)

and yet aware of its own value.
In 2008, MdM left Second Life and moved to the Italian OpenSim world Cyberlandia due to escalating prices charged by Second

Life and also because many of our past collaborators had moved on to different experiences. Soon after, we decided to move from Cyberlandia to Craft-world, the grid founded and managed by Raffaele Macis, also known as Licu Rau, where the museum structure (Fig. 2), conceived and created by

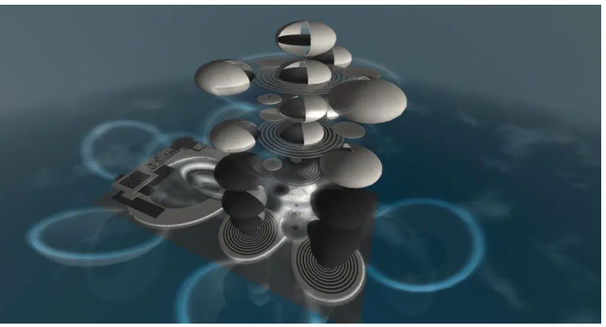

Fig.4 MdM by Arch. Elif Ayiter aka Alpha Auer in Craft World (2015)

Nicola Reinerman, can be appreciated in all its splendour. The modular composition served the continuous architectural and artistic-cultural evolution needs of the Museum (see Fig. 3).
In 2015, the new facility was inaugurated in Craft World, with the esteemed presence of virtual worlds experts Mario Gerosa and Elif Ayiter. The meeting was streamed online. This occasion was particularly appropriate to unveil the new museum structure (see Fig. 4), designed and created by professor and designer Elif Ayiter, known as Alpha Auer in the virtual worlds.
This 3D digital museum houses over 40 artists and installations and provides visitors with the chance to immerse themselves in an environment that can only be found in parallel worlds.
Another noteworthy aspect, skilfully interpreted by the creator, is the capacity of the structure to merge with the artworks themselves to the extent that the museum becomes a complex conceptual work represented by the artists, their creations, the visitors, the owners, and the entire community that has been created and revolves around the museum. The works on display, ranging from photographs to

Fig.5 Arena Exhibition Project (2020), Artwork by Chris Tower

sculptures and installations, are, for the most part, interactive. The associated website serves as an effective means of communicating the museum's mission and planned initiatives.
After a few years of relative stagnation, in the spring of 2020, when faced with the decision regarding the project's future, Rosana Galvani realized that she wasn't ready to let it go. Consequently, she got back to work. This intense effort culminated in the organization of the Arena 2020 exhibition (see Fig. 5), featuring a rotating group of eight artists every month. Arena 2020 went on for four months, from June to September, showcasing the works of thirty-two artists. Each month, the museum had the privilege of hosting two real-life artists, and it was a true delight to see two of these artists being awarded and given the chance to exhibit their works permanently in the Museum.
Cristian Ribichini was awarded the silver stamp and secured second place on the podium of the International Photography Awards (IPA) with two of his photomontages.
Raffaele Ciccaleni, with his stunning watercolours, was selected in the 2020 "Landscape" Malaysia International Online Juried Art Competition.
Starting in October 2020, the MdM has been organizing solo exhibitions of artists from both the virtual and physical worlds. As a result, some stunning exhibitions have been offered, so impressive they could make even real-world galleries jealous.

In 2021, in collaboration with László Ördögh Diabolus (known as Velazquez Bonetto in virtual worlds), the MdM organized a vast retrospective on Second Life artwork produced between 2006 and 2012, titled VOXEL. This retrospective includes an archive section with video documentation of many past art events that took place within Second Life.
In addition to hosting Second Life creations, the Museum has evolved into a cultural centre, where events, including music and video lectures tied to real-world events, openings, performances, and parties, are held. The MdM staff also contribute with their own productions that often include performances and installations.
Events continue to be organised in Second Life, thanks to the fruitful collaborations established with numerous artists and enthusiasts who host those performances. One past example, among many, was the itinerant 22-week-long project "Art&Poetry", which started in September 2011 in both Second Life and Craft World. A more recent example is described below, in the "Current Developments" section of this paper.
Today, the Museo del Metaverso welcomes all sorts of creatives and artists, whether they operate in the physical or in the intangible worlds.

3. Methods and Challenges

The Metaverse Museum has always been a champion of innovation and cross-media creations; in fact, for years it has successfully been able to operate across different media and establish connections with the physical world. These different creations encompass exhibitions, performances, concerts, lectures, conferences, and training courses, relying and making use of all the partnerships already established.
This collaborative spirit has given rise to a social project developed by a community of motivated and passionate individuals.
To achieve the results outlined above, the following elements are essential:

1) The creation of a community composed of artists and people of goodwill who share a love for art and culture and possess specific skills.
2) The management of one or more virtual islands in OpenSim to create a suitable environment. These islands will include a laboratory, equipped as if it were a TV studio, where creative work can be produced. Additionally, it will serve as an appropriate space where people can meet when web-based meetings are not possible, and as a canvas used by the community to shape the project. Currently, several islands are available to the project in Craft World, different locations where the museum offers past and present exhibits that need to be connected. The networking of these locations was achieved through a HUD set up by Velazquez Bonetto, which connects all sites of the Metaverse Museum and CARP.
3) The Museum as a brand: to truly be innovative, a project will have to use new media and network resources: YouTube channels, free streaming services, Twitter, Facebook, Flickr, Pinterest, Google Maps, and the multitude of applications available on our smartphones. Several web spaces are available, including the Museo del Metaverso website, a Facebook group and page, a YouTube channel, the original blog, and Flickr, and allow visitors and creators to make the best of all the benefits that social spaces can offer. Open-source would be a specific requirement of the project; however, having access to all web spaces for free is no longer possible, since some of them come with associated costs.
4) Collaborations: A project such as this requires the involvement of people with a wide range of specific skills, from art critics to sociologists, from Internet experts to authors, from educators to students, from filmmakers to webmasters and actors, from talented builders to screenwriters. Needless to say, it also relies on the work of creative individuals, artists, photographers, and designers. The Metaverse Museum project offers multiple potentials as well as challenges that are worth considering. On the one hand, the Metaverse Museum provides global access and personalized appreciation of art, history, and culture, transcending physical and geographical boundaries. The interactivity and immersive experience offered by the Metaverse allow for the creation of unique and engaging experiences for visitors. On the other hand, there are challenges to address, such as the digital divide, the preservation of digital content, and the fact that people are not used to visiting traditional museums. It's crucial to take proactive measures to ensure equitable and inclusive access, preserve the authenticity and integrity of digital artworks, and address technological limitations.
Our next objectives are as follows:
• Improving Accessibility: developing solutions to reduce the digital divide by making the MdM accessible to more and more people. This involves the adoption of more accessible technologies and the implementation of educational programmes to promote digital skills.
• Preservation of Digital Content: developing robust strategies and standards for the long-term preservation of digital artworks within the Metaverse. This includes the establishment of protocols for managing copyright and ensuring the authenticity of digital creations.
• Artist and Visitor Engagement: exploring innovative approaches to engage artists in the creation of artworks tailored for the Metaverse and to actively involve visitors in the co-creation of content and encourage them to contribute to their own museum experience.
• Integration with Emerging Technologies: exploring the integration of the MdM with emerging technologies such as artificial intelligence, extended augmented reality (XR), and blockchain, as a way to enrich the user experience and expand the possibilities for interaction and content creation.

4. Current Developments
The "phygital" (physical + digital) nature of the Metaverse Museum was fully achieved in 2022, thanks to collaborations established with the Meet Digital Culture Centre in Milan and SingularityU Milan. The former is an artistic cultural hub dedicated to the promotion of digital art and culture, while the latter, Singularity University Milan Chapter, is a community of activists dedicated to studying exponential technologies that will be used to address the world's most pressing challenges and build a better future for everyone. Many streaming connections have been established with these two institutions during exhibitions and lectures focusing on topics related to our project. One of the most exciting aspects of this sort of events is their attempt to create a "unified lecturing space" that is not only "phygital" but also multi-platform. This setup permits the participation of a physical audience in Milan and of a broader audience who is connected remotely via platforms like Second Life, Craft World, and Spatial. A live YouTube streaming of the event offers individuals who are unfamiliar with virtual worlds the opportunity to engage with artists and lecturers. Consistent with this trend, the Metaverse Museum is organizing multiplatform events that may not necessarily occur simultaneously but whose broader scope allows them to encompass diverse communities and virtual worlds. An example that can be used to illustrate the type of events we have just described is the recent lecture series titled "In a Bottle," organized by MdM in collaboration with Stefano Lazzari (aka Stex Auer) in Second Life. During one of these lectures, photographer Carmelo T. Russo presented his real-world photographs of lighthouses from around the globe. This presentation evolved into an exhibition (inaugurated in Second Life on June 24, in Craft on July 1, and on Spatial on July 7, 2023) that featured Russo's works, Fiona Saiman's photographs of the numerous 3D lighthouses existing in

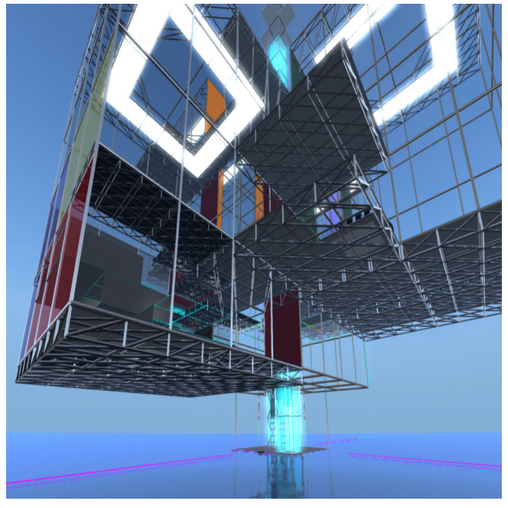

Fig.6 New MdM (2023) by Velazquez Bonetto aka László Ördögh

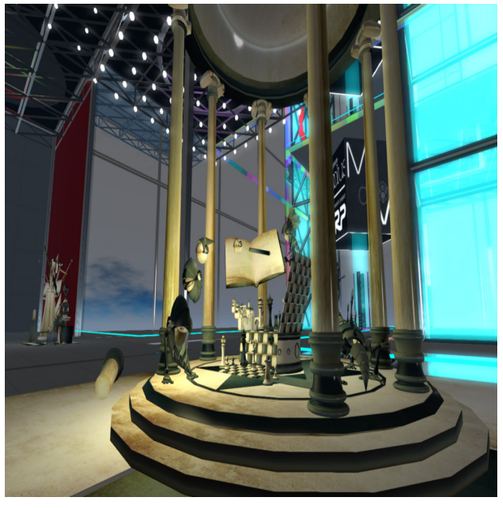

Fig.7 New MdM (2023) by Velazquez Bonetto aka László Ördögh, Artwork by Daco Moonday

Second Life and OpenSim worlds, and Sergej Zarf's AI-generated images of lighthouses. The Spatial web-based platform for virtual worlds is the most recent environment used by the Metaverse Museum. There, it has organized several cultural meetings and exhibitions during the current year (see the References section for the corresponding URL).

Currently, the collaboration with László Ördögh Diabolus (aka Velazquez Bonetto), the founder of C.A.R.P. (Cybernetic Art Research Project) in Second Life, has been resumed and CARP and MdM are once again partners.

In the forthcoming months, a new museum facility (see Figs. 6 and 7) will come to life in the Metaverse Museum region called Mare di Jack la Bolina. This new facility was designed and created by Velazquez Bonetto who sought the cooperation of Fiona Saiman to create green spaces and playful environments within the museum.

Conclusions

In 2007, when the Metaverse Museum was created, 3D artworks were still considered a novelty and not yet widespread. However, over the last few years, interest in this type of creative expression has grown rapidly, thanks to improvements in 3D printing technologies and the expansion of the Internet. Today, 3D creations are used in a variety of fields, including architecture, design, fashion, film, and art.

In recent years, there has been a significant evolution in the way the general public and, more specifically the art world, looks at 3D artworks. Initially, this art form was met with some curiosity and caution, as it was a relatively new and unfamiliar territory. However, over time, 3D artworks have garnered more and more appreciation and recognition as a valid and meaningful art form.

When they use the three dimensions, artists are able to experiment with shapes, textures, and effects that were previously impossible to achieve. This art form is often associated with modern, cutting-edge technologies such as virtual reality and augmented reality, which have helped make 3D artworks even more accessible and engaging to the public.

As a consequence, digital museums have gained increasing recognition. Digital museums displaying 3D artworks have been enthusiastically welcomed and are becoming increasingly popular. These institutions provide a digital platform for the exhibition and the sharing of works of art, allowing the public to access virtual collections from anywhere in the world. Digital museums offer a great opportunity to democratize art by removing the geographic and economic boundaries that often restrict access to artistic heritage.

The reputation of 3D artworks and the digital museums that house them is evolving positively, as these forms of artistic expression are increasingly recognized and appreciated.

The way people looked at digital museums started to change when real-life artists began to exhibit their creations in the Metaverse Museum. This started in 2020, during the pandemic, but the requests kept coming and many exhibitions featuring artists who are known to use traditional methods to create their images and have little or no connection with the virtual worlds continue to be offered to the public. Recently, two such exhibitions were presented, the photographic exhibition on Lighthouses by Carmelo T. Russo and the exhibition 'Humanity', which featured a reportage from Ethiopia, by Giacomo Maroni, both presented in Craft, Second Life and Spatial.

In conclusion, the Metaverse Museum represents a groundbreaking evolution in the museum industry, offering substantial advantages in terms of accessibility, interactivity, and engagement. Nevertheless, it is essential to address some challenges and to continue exploring the cultural and social opportunities and implications linked to the adoption of the Metaverse for museums.

The concept of museum, conceived and implemented by the founder, is that of a constantly evolving place, not merely a space for preservation and exhibition, but a living and fertile environment for ideas, where it is possible to experiment and share experiences with others working in the virtual world across various fields, such as art, architecture, music, theatre, cinema, and literature.

MdM continues to operate in Craft to breath continuous new life into the project, preventing it from falling into silence and oblivion. This fate will however prove inevitable, if no one takes on the task of adding new chapters to a story that has no planned end, drawing inspiration from what we have done in the past to create new experiences in the future.

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Museu do Metaverso grupo e a página do FaceBook: https://www.facebook.com/groups/museometaverso/

Museu do Metaverso blog: http://museodelmetaverso.blogspot.it/

Museu do Metaverso URL no Craft-world: http://craft-world.org:8002/MdM/616/641/21

O Craft-world é um mundo virtual baseado no OpenSim que necessita da instalação e utilização de um visualizador no PC para ser visitado. Não suporta dispositivos de realidade virtual.

Museu do Metaverso sítio Web: https://rosannagalvani.wixsite.com/museodelmetaverso O Spatial é um mundo virtual baseado na Web que pode ser visitado através da Web, depois de se registar em spatial.io. O mundo virtual também pode ser visitado através de um dispositivo de realidade virtual.

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Documentação vídeo

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The City of Women: an Educational Project

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Abstract
The project The City of Women, particularly in the section Out of the Labyrinth - A Room of One's Own, is addressed to schools. Its prime goal is to contribute to reducing the gender gap in the dissemination of women's literary works, in accordance with the UN Sustainable Development Goals for 2030, particularly those laid down in Goal 5, which focuses on Gender Equality.
Tonino Lane, a well-known builder, was responsible for a project that involves the construction of ten visitable buildings designed to accommodate female writers, most of them poets, from different historical periods. There are 100 of those buildings so far.
The literary and symbolic value of their writing and the critical and innovative ideas they address were considered when selecting the writers.
The project is a work in progress, with new women writer constantly being added as a result of the publication of new works, cultural and political events and of suggestions made by visitors.
The City of Women is visited by schools and art enthusiasts due to the originality of the project, which, to the best of my knowledge, is unparalleled worldwide.

Keywords: Gender Gap, Writing, Literature, Art, Women, Education.

Introduction
The City of Women project, particularly in the section Out of the Labyrinth - A Room of One's Own, is addressed to schools and its primary goal is to contribute to reducing the gender gap by promoting women writers' literary works, in accordance with the UN Sustainable Development Goals for 2030, particularly those laid down in Goal 5, which focuses on Gender Equality.
The core idea behind the Out of the Labyrinth - A Room of One's Own project is to emphasize and amend the exclusion of women writers' voices from literary production. Such rejection is no longer justifiable considering the progress made towards achieving gender equality—an achievement that is quite recent but that results from the conscious or unconscious contributions of all the women writers who have found their "room of one's own" on NoiLab[1], the ideal and tangible inheritance of Virginia Woolf's reflection.
The project involved the construction of ten visitable buildings designed and built by Tonino Lane, whose rooms will host female writers, poets for the most part, from different historical periods.
The evolution of these ten structures mirrors the evolution of culture towards a more equitable recognition of women writers' contributions to the development of literary models and stylistic features and the consequent progressive emergence of women figures with major impact, not only on literary production but also on literary dissemination.
Approximately 100 women writers were selected and this particular choice was guided by several factors: the literary and symbolic significance of their writing was evidently taken into account, as was the critical and innovative force of the models they introduced.
The project aims to inform and disseminate knowledge but also seeks to be thought-provoking, as evidenced by the questions scattered across the landscape. Finally, it encourages action thanks to a workshop zone that offers literary writing courses and in-depth thematic studies.
Since the early years of the 20th century, the issue of gender gap in the transmission and dissemination of literary works by women writers within the European context has experienced a significant breakthrough, thanks to the commitment of female journalists, polemicists and educators whose primary goal was to align women's educational paths with those of men.
Additionally, activists from women's and feminist organizations fought hard to make sure that women could fully exercise their civil and human rights, starting with the right to vote.

1. Framework
The project was launched in May 2020, following the conclusion of a long teaching career, first and foremost, as a way to maintain my educational activity and reach out to a potentially broad audience with whom I could share my disciplinary expertise, but also to make teachers understand that digital schooling, as a complement to physical schooling, offers valuable educational opportunities.
The decision to choose the virtual world Craft World, built using OpenSimulator, was driven by the exceptionally low costs involved compared to the other existing educational technology and by the continuous support (24/7) provided by

1 OpenSim URL: CraftWord.org:8002:n-oilab

the owner and manager of Craft World, Raffaele Macis. The practical realization of this project was made possible thanks to our longstanding collaboration with Tonino Lane, which started back in SL in 2007 and continues to this day, who has always demonstrated a remarkable ability to consistently and accurately interpret the design concepts described.

In the virtual worlds, there is a striking lack of projects aimed at the Italian public, while studies focusing on women's writing remain scarce and unfamiliar to the general public.

The first part of the chapter broadly outlines the different thematic sources from which I drew the motivation and impetus to proceed with the progressive expansion/updating of the project. The workshop environment of the project requires continuous updating of information sheets on women writers and visitors are constantly encouraged to cooperate by suggesting names and works by women writers and artists that would be added to those already included.

Another feature of the project is that it closely aligned with the ever-evolving cultural and political conditions on our planet, as evidenced, for instance, by the construction of an Afghan village, following the return of the Taliban to power, to house female activists and writer figures.

Finally, the project stands as a cultural space open to other creators, as evidenced by the existence of the LAP (Laboratory of Public Art) within The City of Women an urban exhibition conceived and curated by multimedia artist Elisa Laraia, a lecturer at the Academy of Fine Arts in Naples and at the Federico II University of Naples.

2. Motivations

The City of Women educational project is based on an extensive literary production that has explored and continues to explore the theme of the emergence from oblivion, determined by the enduring norms dictated by a patriarchal society, of female writers, philosophers, polemicists, educators who, over time, have laid down the ideal and ideological foundations for the achievement of such endeavour.

The journey continues through the continuous emergence of new female figures, namely poets and narrators, painters, sculptors, architects, scientists, philosophers, theologians, mathematicians, and computer scientists, whose works have been undervalued by the printing and publishing industries, overshadowed by their life and study companions, or excluded from school and academic study paths.

The bibliography on this subject is extensive. The literary theme, of course, is intimately intertwined with the struggle to liberate the female figure from her fate as man's handmaiden.

"Today," writes Dacia Maraini (Maraini, 2023), "almost two thousand years later, there are still women who suffer like her (Hypatia) for the simple reason that they thought for themselves, that they wanted to study, investigate, and oppose totalitarianism."

These women are still fighting for their rights across the globe, from the Middle East to the Western world, where civilization seems to have reached a ripe old age but has not yet matured enough to fully embrace women's values and roles.

Tiziana Plebani's (Plebani, 2019) perspective is also equally interesting, as she considers that women' s private or everyday writing are productions that document the multiple and irreplaceable roles that women have played in every society and that have been crucial for the growth of said societies.

The crucial importance of the role played by women writers is highlighted in the works of Luisa Bergalli and Sandra Petrignani. Bergalli (Bergalli, 1726) wrote about the 'merits' of 'female genius' and left an indelible mark with her work. Her seminal 1726 work continues to be broadly cited in contemporary studies on the subject, providing informative and popularizing contributions and establishing a new canon for reading women's writing, particularly

that of Gaspara Stampa and many other authors as well.

In the words of Petrignani:

> Many years have passed since the first publication of this successful booklet, which was loved by women beyond expectations. Many things have happened in these years: the women writers interviewed have all disappeared, some have seen their fame grow, some have been forgotten. In any case, the words collected in these interviews have weight and meaning, the passage of time has not disapproved them. For however fashionable it may have become today, women's writing still lacks the authority and prestige it deserves in many cases and needs to be preserved and remembered. As far as I am more directly concerned, I am happy to read sentences written so many years ago with undiminished pleasure, and I hope that readers feel the same (Petrignani, 2022).

No less important is the role of those who, like Anna Maria Mozzoni (1837 - 1920), have addressed the issue of equality of methods and content in the education methods and content of men and women. Mozzoni argued that:

> To deny women a complete reform in their education, to deny them more education, to deny them a job, to deny them an existence in the city, a life in the nation, an importance in opinion is no longer possible; and the interests hostile to their resurgence may well delay it with an ungenerous fight, but never prevent it(Mancina, 2003).

This path began with Christine de Pizan, who, in the 'Cité des Dames' (Caraffi, 2004), governed by Reason, Righteousness, and Justice, laid the foundations for women's history. She starts with the absence of a written female tradition, and recognizes that different education provided to women has greatly contributed to this situation. In her work, Pizan exhorted that women and men should receive the same education, claiming that women "would learn just as well and understand the subtleties of all the arts as they do" and added that the deeper reason for this difference lays in the fact that men "would be much vexed if women knew more than they do".

3. The Path

The educational project The City of Women, Out of the Labyrinth - A Room of One's

Fig.1 The Labyrinth of Knossos - Entrance to The City of Women

Own, involved the construction of a series of visitable buildings by builder Tonino Lane, which are connected by a path and were designed to house women writers, poets mostly, from different historical periods (see Fig. 14).

The path starts at the labyrinth of Knossos to highlight the symbolic significance of the story of Ariadne. In this story, Ariadne was abandoned by Theseus and comes to realize that seeking salvation by relying on another male figure, Dionysus, instead of relying on

herself is a deception.
From there, we head to the Sumerian age, in the company of the priestess and poet Enheduanna (c.2400 B.C.), whose biography

Fig.2 Sumerian boat with Enheduanna's profile (séc.XXIV a.C.)

and part of her work are etched onto the sails of two Sumerian boats, powerful symbols that represent the remarkable voyage of culture and poetry, from their female origins to our times.
The urban layout and the architecture of the buildings form a novel labyrinth, free from physical constraints and prohibitions, where visitors can meet female writers who fluctuate between obeying and breaking down prejudice and stereotypes, both in their personal lives and their literary works. The city's layout takes us on a journey through different historical periods, from the Sumerian è-sig-a (k), built around the great hearth, to the Greek *οικία*, from the Roman domus to the medieval monastery, from the urban mansions of the thirteenth and fourteenth centuries to the Renaissance court represented not by the grand Italian courts but by the suburban castle of Isabella Morra in Valsinni (the place where Isabella became the first-known victim of feminicide in Basilicata's history) (Fig. 7). The visitor wanders from the Baroque buildings, home to the predominantly secular Academies, which took culture from the courts, convents, and universities dispersing it into the eighteenth-century mansions that hosted not only scholarly academies but also institutions opened to the public enjoyment of culture, like

Fig.3 Οικία (VIII – II cent. bC)

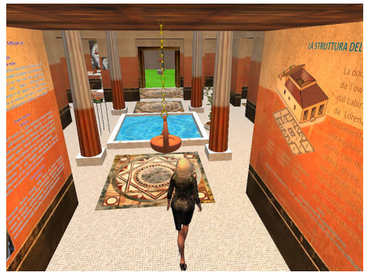

Fig.4 Roman Domus (VIII cent. bC – V cent. AD)

Fig.5 Medieval monastery (XI –XIII cent.)

Fig.6 City mansion (XIV – XV cent.)

libraries, literary cafes, and gardens. Moving forward, visitors are introduced to the aristocratic salons of the nineteenth century, where poets from the Italian Risorgimento and positivist storytellers and narrators

Fig.7 Isabella Morra's castle (XVI cent.)

Fig.8 Ca' Rezzonico (XVII cent.)

Fig.9 Villa Stella (XVIII cent.)

Fig.10 Noicattaro city theatre (XIX cent.)

were formed. To represent the nineteenth century, we chose the building that could most accurately symbolize the social and cultural transformations of that era: the theatre, modelled after the world's smallest theatre, the city theatre of Noicattaro, built in an olive oil mill around 1810 (Fig. 10). To represent the twentieth century, a century marked by significant technological innovations, we chose to design a building that reproduces the first real challenge to traditional architectural standards, based strictly on angular modules (the Baroque had already attempted this revolution): the "Endless" by Kiesler, whose drawings are preserved at MoMA in New York (Fig.11). We also chose to include the Astronomical Observatory dedicated to Margherita Hack as a symbol of the crucial role played by women in STEM studies and professions (see Fig. 12). To portray the twenty-first century in a way that could synthesize its

Fig.11 Endless House (XX cent.)

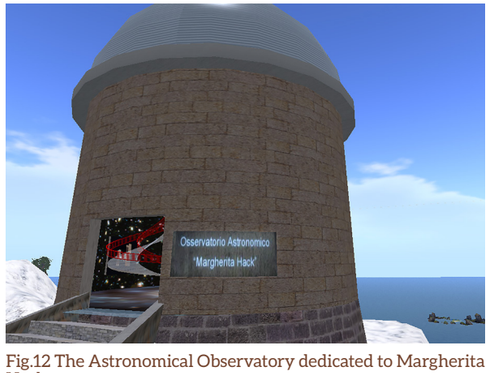

Fig.12 The Astronomical Observatory dedicated to Margherita Hack

Fig.13 The XXI Century - The wandering houses in the forest

contradictions posed a real imaginative challenge. Our answer was to represent it as a projection of a visionary future where humankind and nature would coexist in harmony. Tonino Lane, who designed the project, introduces a set of houses oscillating between primitivism and hyper-technologism that are scattered across a large forest (Fig.13). This project bears the signature of Fabio Fornasari and is inspired by Japanese architect Terunobu Fujimori. The evolution of the buildings mirrors the simultaneous evolution of culture towards a more equitable acknowledgment of the contribution of women writers to the development of literary models and stylistic features, which has led to the gradual emergence of women figures who had a major impact not only in production but also in literary dissemination.

The selection of women writers was guided by a wide variety of motivations. I have considered, on the one hand, the literary and symbolic value of their work and, on the other hand, the critical and innovative force of the models they proposed.

The limited presence of women writers in European literature depends not so much on their small number but rather on a reduced dissemination of their works that will eventually make them fall into oblivion. This is mainly due to the fact that cultural transmission has been, and still is, governed by male figures and to the persistence of stereotype-driven interpretations of literary traditions.

Fig.14. Overview of The City of Women

I would also like to point out that I have, as far as possible, stressed the significant roles that women have played in the transmission and distribution of books, as professional writers, amanuenses, miniaturists, printers, printing entrepreneurs, and publishers, among others.

The project has also paid great attention to toponyms by naming streets after women writers. Their names, along with excerpts from their most significant texts, are featured on the plaques scattered across the city. The immersive educational dimension of our project is highlighted by the workshop zone dedicated to my literary writing courses. This area, set up by the sea and immersed in a colourful soap bubble, serves as a celebration of creativity.

Recently, The City of Women has inaugurated its own location in Spatial[2] , a virtual world that can be accessed via mobile phones and computers. This new tool not only facilitates access for teachers and students but also allows for the creation of appealing games. Users can access other rooms through dedicated portals, which favours the use of puzzles and quests that will, in turn, pique users' curiosity.

4. Our focus on Digital Immersive Learning

Let us start with a definition of the Metaverse that has recently been provided by Matthew Ball, that I consider quite comprehensive:

"The Metaverse is a persistent network of real-time rendered 3D virtual worlds that can be experienced synchronously and persistently by an effectively unlimited number of users with an individual sense of presence and with continuity of data, such as identity, objects, and past transactions" (Ball, 2021).

The Craft World OpenSim grid, where I operate, provides school regions accessible

2 URL: https://www.spatial.io/s/Azzurra-Collass-City-of-Women

exclusively to teachers, assistants, and students. Underage students with anonymous accounts are only granted access to the protected environment of the near 100 existing school regions. It is worth noting that no sensitive data of underage students is recorded or made public, guaranteeing total security.
Those are some of the activities that are accessible to avatars/students:
•Avatars/students can explore regions of different virtual worlds, whether it be Second Life, Craft World, or other platforms based in OpenSimulator.
• They can socialize, meet other fellow residents, and engage in communication through written messages and voice communication.
• They can organize personal activities or participate in group activities, such as concerts, gatherings, courses and lectures, content creation, exhibitions, and parties.
• They can take photos, produce movies, design scenery, and stage theatrical performances (machinima).
• They can acquire their own land to carry out their projects, that may include educational environments, historical reconstructions, or simply the creation of their virtual homes or entertainment venues.

4.1. Key Concepts
• At the core of virtual worlds and the Metaverse lies the concept of community, the idea of individuals coming together, collaborating, and increasing each other's' skills or creativity.
• Once we overcome the difficulties that involve access to the platform, which often requires a powerful computer and viewer, the Metaverse proves particularly useful for the inclusion of disadvantaged individuals or those whose language differs from the predominant language of use.
• Since virtual worlds provide us with the tools to easily create realistic and fantastical environments and to make them endure over time, they become the backdrop for the most incredible cognitive adventures, as evidenced by my project The City of Women, which houses, in environments constructed with philological accuracy, female writers from different times. These cognitive adventures also include the recreation of Dante's Inferno, Purgatory, and Paradise, as well as the reproduction of Athens and other Homeric settings using different sims, curated by teachers and other enthusiasts.

4.2. Resulting Competencies
Virtual reality provides the tools to transcend the confines of traditional classroom spaces, often regarded as closed places at the service of a transmissive educational model that is no longer compatible with the collaborative dynamics required by active teaching. It places students in a context of continuous learning, enabling them to articulate their thoughts, engage in discussions with the other members of the working groups, and ultimately share their conclusions with their peers using digital artifacts.
If we believe that the primary objective of education should be to empower students in the acquisition of knowledge, motivating them to become the protagonists of their own educational journey by using methods that foster problem-solving and collaborative learning, then virtual reality emerges as the ideal place.

4.3. Cognitive Competencies Developed by Virtual Reality
From the Learner's Perspective:
• It expands the different areas of learning.
• It promotes learning in multidisciplinary and interdisciplinary ways.
From the Teacher's Perspective:
• It allows for the implementation of flipped classrooms.
• It enhances the relational aspects of education.
• It transcends, by incorporating its relational aspects, the transmissive teaching model and adopts open models of active teaching.
• It encourages an approach to content that goes beyond memorization, favouring elaboration and internalization processes by placing them in philologically reconstructed or creatively interpreted 3D contexts.
• It promotes the integration of disadvantaged students into collaborative workgroups.

4.4. Broader Educational Competencies Developed by Virtual Reality
• The ability to collaborate, which is a necessary condition for the successful execution of complex projects;
• The opportunity to experience and exercise the concept of active citizenship;
• The capacity to form research-based and experience-based judgments regarding the relationship between social and natural realities and advanced technology.

Conclusions
Immersive educational experiences in Craft World have demonstrated, based on the results obtained from the specific evaluation questionnaires administered to the students, that an active learning that involves "learning by doing to acquire content and skills" has been found to increase content learning and enrich communication skills. While doing so, it also fosters an understanding of the harmonious relationship between civil and digital citizenship.
Moreover, a better and more effective integration of disabled students into the course has been achieved, thanks to the support of teachers, to the team of internal teachers and external experts.

Documented educational experiences, implemented by the author in collaboration with Tonino Lane and other teachers:
• Gianni Rodari Project – Scuola Primaria "Goldoni"- Latina (Italy) – with Ms Luciana Mattei (teacher)
• Martha Gellhorn - Progetto"Venti di guerra" - ITIS Einstein - De Lorenzo - Potenza (Italy)- with Ms Annalisa Caivano (teacher)
• Project "La Scuola nel Metaverso " - Scuola Primaria "Goldoni"- Latina (Italy) - by Ms Luciana Mattei, in collaboration with the author and Tonino Lane
Visits to the project:
•Accademia di Belle Arti di Napoli (Italy) – by Professor Elisa Laraia (also lecturer at Federico II University of Naples).
•Liceo delle Scienze Umane "Gianturco" - Potenza (Italy) – by Ms Elvira Cavallo (teacher).

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Impacts of the Digital Age: an essay on the paradigm shift

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Abstract
Western societies have been conditioned to act with a focus on the near future, grounded in identities deeply rooted in a distant past. The digital age began decades ago, yet insightful analyses among both citizens and media discourses are scarce. In fact, the present is a territory of immediacy marked by great speed, leaving us with insufficient time for constant focus and thoughtful reflection on a world that communicates almost at lightspeed. Drawing on studies conducted by prominent authors, this essay aims to reflect on the emergence of infocracy and its difficult connection with a progressively weakened democracy. Indeed, evidence points to significant shifts in social and political paradigms. Our aim is also to delve into these changes and anticipate possible alternative pathways in response to less favourable scenarios

Keywords: digital society, infocracy, dataism, human communication.

Introduction
The aim of this project is to reflect on the transcendence of the disciplinary regime paradigm and the abrupt entry into a new infocracy of transparency. The dehumanizing effects of impossible work rhythms and the complete dependence on the fast-paced digital world constitute a paradox in human existence that accentuates the pressing need for such reflection. At a time where infotainment and clickbait often hinder public engagement and where major algorithms serve as tools for the largest private companies, we are witnessing the privatization and manipulation of the public space gradually succumbing to narrative chaos. It is therefore reasonable to consider that open-source software tools may represent one of the last hopes for preserving a free public sphere.
This reflection, more essayistic than numerically data-driven, is divided into four parts: the first part will contextualise and seek to understand some of the sensitive shifts that have occurred in the last 30/40 years, while identifying the primary operational concepts. The second will provide some definition of the realities affected by these changes. Then, the coexistence of the two changing worlds, the old and the current, is described. Finally, as a conclusion, an effort will be made to outline some foreseeable scenarios in light of the apparent transcendence of previous social paradigms.

1. Framework: digital reality and subsequent changes
The last 40 years stand as the only period in history where it is truly legitimate to profess that, within a single human lifetime, everything has changed. The pace of change has been gigantic. It's safe to argue that individuals over 40 represent the first generation who can justifiably claim that everything was different in their childhood. This shift is primarily a consequence of the disciplinary panopticon being overtaken by the transparency regime in the infocratic arena (Han, 2022), a topic we will address later on.
Quoting Harari, "in 1016 it was relatively easy to predict what Europe would be like in 1050, (...) it was clear that in 1050 Europe would still be ruled by kings and priests, that it would remain an agricultural society (...). In contrast, in 2016, we have no idea what Europe will look like in 2050" (2021, p. 72). This unpredictability is one of the major challenges of our time and also a source of tension and anxiety.
We usually classify history into periods. Each period has major shared elements: economics, politics, religion, and social relations. The Medieval Era was feudal, monarchic and agricultural, and lasted about 1000 years. The Modern Era, which gradually began around the 15th century, witnessed the ascent of a bourgeoisie engaged in travel and trade, paving the way for the emergence of science: it lasted for about 300 years. The Contemporary Era will have lasted for about 200 years and has already ended... Some could even argue that the advent and expansion of the internet and global connectivity mark the beginning of a new era. In less than 40 years we have shifted from a humanistic world seeking to implement contemporary values (liberté, égalité and fraternité) to a new world where reality itself has multiplied, allowing for the coexistence of two worlds or two objective realities, the analog and the digital. We chose this terminology because both realms are

equally real and because the term “virtual” carries a connotation that contradicts its true essence, implying that “virtual” is more potential than effective, whereas the digital world is very much effective and not merely a potentiality. The changes brought about by this widespread global connectivity are so striking and novel that, even though we may not fully understand them yet, people can no longer live without the digital. Political and economic systems are now entirely dependent on this global connectivity, and our interactions with others are heavily shaped by digital technology.

Before September 11, 2001, a broad discussion concerning global changes began in academic circles. There was talk of the end of history and the shift of social paradigms (Fukuyama, 1992). The fall of the Berlin Wall and the reconfiguration of the world following the dissolution of the Soviet bloc had also to be taken into account. Mass communication, typical of that period, was reaching its peak, and the population embraced the widespread internet as a newfound space of freedom, liberated from the surveillance of the states. There was a belief that nation-states were on the verge of collapse, and that the world was heading towards a generalized freedom of opinion unlike anything seen before. Then, the internet spread all over the world and companies realized its lucrative potential. Over time, the internet gained increasing important across nearly every sector of the public sphere. It was all over and, free from rules, was appropriated by modern-day feudal lords who feudalized and regulated it. As a consequence, the internet became more and more a private sphere, devoid of truly free and public spaces, more a source of profit than of free communication.

At that point, marketing prophets and builders of meaningful narratives, often detached from objective reality, started to proliferate. Economic growth became the priority, giving rise to a multitude of startups, incubators and entrepreneurs. Digital nomads and digital natives emerged, and a whole new language was created – which we dare to consider as the embryo of a new language, reminiscent of the concepts depicted in "1984" (Orwell, 2007).

The legitimization of the eternal intern begins and we observe the disintegration of jobs, which transformed into learning opportunities rather than equitable, properly paid positions. The acceleration of deadlines, KPIs (Key Performance Indicators) and the imposition of continual work from any location became new norms. The paradigm was definitely shifting, although some attachments to liberal capitalism still persisted.

The emergence of this new dynamic can clearly be traced back to September 11, 2001, which prompted states to experience one final major reaction, almost like a final gasp of their industrial practices. New rules were devised that would definitively pave the way for the privatization of the digital public space. September 11 added an essential ingredient to a new social order: fear in the Western world. The wave of fear consecrated and amplified by the audience-hungry news media blind to its repercussions, led to the legitimisation of Patriot Acts almost everywhere, and of systems like Echelons and NSAs which, due to their inability to control through surveillance, proved that Foucault's theory of the disciplinary regime had been surpassed. Coercive surveillance gave way to the voluntary exposure of private space. It was at that point that we witnessed the refinement of tools that were meant to reinvent the social paradigm.

Let us elaborate on the idea of surpassing the disciplinary regime. Michel Foucault effectively explained the notion of industrial society defined by the rules set within what can be called a disciplinary regime that shapes compliant bodies (Foucault, 1987, p. 155): The disciplinary regime is the form of domination of industrial capitalism. It assumes a machine-like model, where each individual is a small cog in the machinery of disciplinary power. It penetrates nerve circuits and muscle fibres and turns “a shapeless mass, an unfit body” into a “machine” (Han, 2022, p. 9).

What was happening at the turn of the century marked the advent of a new form of dominance that transcended the orthodoxy of liberal humanism. It is worth briefly defining the three primary currents of thought that have brought us to the 21st century. According to Harari, these are liberal humanism, socialist humanism and evolutionary humanism (Harari, 2020, p. 273), which he understands as religions with distinct sets of norms linked to the belief in a superhuman order. Liberal humanism "argues that each human being is a unique individual" to whom "we must give all possible freedom"; "the free will of each individual must always outweigh state interests or religious doctrines" (Harari, 2021, p. 278). The main defenders of the other humanisms were the followers of Marx (for the socialist) and the followers of Hitler (for the evolutionary). They diverged from liberalism primarily in their perception of human experience as an individual process.

In other words, in the peak of capitalist liberal humanism, somewhere after September 11, a profound shift occurred from the disciplinary regime described by Foucault to an information regime described by Han. The control over data, which has transformed individuals into "data and consumer cattle" (Han, 2022, p. 9) has now become more important than the exertion of power by the states and of authority through the performance of authority itself.

Now that we've introduced the concept of the information regime, it is appropriate to clarify this term, which is often misunderstood in Portuguese and, therefore, not always analysed correctly. The term “information” as used by Han and the new paradigms does not correspond to the Portuguese term “Informação”, which refers to news or the act of informing.

In Portuguese, Informação is frequently employed as one of the many hasty translations of English expressions, akin to "virtual" or "event", which is also negligently translated as “evento”. In this context, the word "information" is not to be confused with "news" or “notícias”, but rather refers to data transmitted within transmission processes. The content or meaning of the "information" sent or received is irrelevant in this context and can be defined as a "measure of the predictability of the signal" (Fiske, 1998, p. 23). Here, information is regarded as dehumanized data in the typical sense of computing and signal engineering.

Given these clarifications, it is worth revisiting the notion that the changes that have occurred over the last 30 years have been truly remarkable and have led to such profound alterations that we can perfectly argue that we live caught between generations disoriented and disturbed by a mix of values that we have yet to properly map. We measure the world using value frameworks from the 80s and 90s, yet we use tools that expedite results and are governed by entirely different values. A public hospital exists to save lives, but its management is centred on outcomes where lives, albeit crucial, are not always top priority. This shift creates the paradox of the coexistence between healthcare professionals committed to a humanitarian mission and technocrats trying to leverage health for profit. Journalism emerges with a clear social mission, ensuring the

balance of representative democracies, but its potential for profitability often distorts its essence, selling readers to advertising instead of selling news to readers. The aim of a welfare state is to ensure the well-being of all, yet its management is too often guided by cold parameters that put the mathematics of efficiency and budget compliance first, constantly compromising its social commitment. A capitalist economy presupposes constant growth. Resources are running out, but the economy has to keep growing. This is the immediately discernible element of the change in the last 30 years: reality founded on paradoxes.

2 . The impact of change

2.1. The different realities; objective, subjective and intersubjective

To fully understand this change and our perception of it, we must turn to Harari's summary of reality since we cannot discuss real change without clearly clarifying what reality is, especially after delving into digital and analog realities.

According to Yuval Noah Harari, we can assume three types of reality. Two of them are quite familiar to us: objective and subjective. Objective reality is the one that which exists "independently of human consciousness and belief" (Harari, 2021, p. 164). Gravity is a good example of this, affecting us all whether we believe in it or not. Subjective reality, on the other hand, exists solely within "the consciousness and beliefs of a single individual" (Harari, 2021, p. 164). A good example would be the individual who visits a doctor due to severe headaches. After a battery of objective tests, the doctor tells him that he is healthy and, objectively, not ill. However, the pain the individual feels is real to him, subjectively real.

There is yet a third type of reality, as previously described by various authors such as George Mead (1972) since the first half of the 20th century: the so-called intersubjective reality. A good example of this type of reality is money. We are led to believe that if money exists and drives the human world, it must not be a subjective belief of mine but rather an objective reality. However, this reality results only from communication between human beings and not from an inherent objective value. In the case of money, we can see that it possesses "no objective value. You can't eat, drink or wear a dollar bill. Nevertheless, as long as millions of people believe in its value, we can use it to buy food, drink and clothes" (Harari, 2021). In reality, we are facing a meaningful reality generated from artificial signs intentionally created for communication (Eco, 1997). Intersubjective realities "are founded on communication among a large number of human beings rather than on the beliefs and feelings of singular individuals" (Harari, 2021, p. 165).

Following Harari's ideas, we can assert that the rise of Homo sapiens is a consequence of the ability to create intersubjective realities that allow the complexification of social systems, achieved through cooperation based on shared beliefs such as the distinction between "us and the others". At its core, what defines a nation, if not an intersubjective concept founded on shared beliefs among individuals enshrined in documents like "The Constitution"?

Harari refers to this powerful tool of the human cognitive revolution as fictions. The concept may seem strange given the lesser weight we generally attach to the term, separating reality from fiction. However, an essential part of reality, the intersubjective, is precisely that: a fiction. A reality that is fiction. This operative term is crucial, especially because lately we have heard a similar term used to describe what is happening around us: the narrative. Let us examine different visions or narratives about Portugal. Those who are regular viewers of CNN and CMTV will tell you that Portugal is positioned at the bottom of the world and that there has been a gigantic financial setback in terms of security, health, and

the economy. However, another segment of the community that remains more distant from these sources of information may construct a narrative that indicates that our life today is much more comfortable than it was 40 years ago, due to all the innovative services at our disposal and the access to an unprecedented quality of life.

Yet, which of these narratives is the real one? The answer is immediate: both are real because both are fictions or intersubjective realities, almost exclusively based on communication among individuals... To understand something as complex as a country's experience, it is essential to conduct three analyses to encompass the three possible realities:

1 - what is objectively happening, involving exhaustive on-site analyses and the use of tools with appropriate scientific rigor;

2 - what is being told, creating an intersubjective fiction, which may inevitably differ from what is happening objectively;

3 - what I feel subjectively, depending on my beliefs and emotions.

2.2. The intersection of times: Foucault e Han – the blending of worlds

As mentioned earlier, the last 30 years have seen is an unparalleled acceleration in the transformation of these three realities. We have already witnessed objective changes, such as the widespread use of the Internet of Things, job obsolescence, or technological enhancements of the human body. All these changes are more than likely to be exponential, judging by the rapid acceleration of processing capacities and the exponential growth in data collection. As an example, one of the most concerning objective changes relates to addictions, which have already been clinically measured. Currently, we suffer from severe dependencies closely related to the use of technology (Haynes, 2018).

In this case, our objective reality is that individuals have become addicted to the dopamine rush generated by the images and sounds provided by our devices. In this respect, and almost ironically, we chose to question ChatGPT and ask for an explanation regarding the random reward syndrome, a concept whose first experiences and formulations were addressed by the renowned psychologist B.F. Skinner in the first half of the 20th century:

> Random Reward Syndrome (RRS) is a term coined to describe the impulsive behaviour associated with the pursuit of varied and unpredictable rewards, especially concerning excessive use of the internet, gambling, social media engagement and other addictive behaviours. This syndrome can be characterized by a vicious cycle in which the person repeatedly seeks a reward, even in the absence of a clear or consistent reason for doing so.
>
> RRS is often associated with the excessive use of smartphones, social media, and online games, which provide random and unpredictable rewards in the form of likes, comments, or gambling opportunities, among others. When people experience these rewards, they feel a temporary increase in dopamine, a neurotransmitter associated with feelings of pleasure and happiness. This dopamine boost may lead to impulsive behaviour as individuals seek greater and more varied rewards, which can result in long-term mental and physical health issues. While RRS is not officially recognized as a medical condition, it is often discussed in relation to the negative impacts resulting from excessive use of technology and internet on mental health. It's important to remember that individuals may be

predisposed to impulsive and addictive behaviours, and RRS may be a symptom of such inclinations
If you suspect you are experiencing RRS or other related mental health-related issues, it is highly advisable to seek professional help" (OpenAI, 2023).

This was the answer provided about a seldom-discussed pathology. However, we could pose additional questions about the neurological impact of screen use by children, about the effects of early harmful exposure to inappropriate content (such as unrestricted access by children to social media and streaming platforms). These are obvious changes in objective reality and neuroscience offers an inexhaustible source from which to draw information.
Another objective change we are experiencing is our deep connection to smartphones/sociometers that carefully record all data associated with our existence whenever we are online in our analog world. "The smartphone is a psychometric recording device that we continuously feed with data, day by day, or more accurately, hour by hour" (Han, 2022, p. 26). This fact is no longer part of an incredible or surprising narrative, as the overwhelming majority of application users willingly authorise these functions (like the use of cookies, for instance) and confidently share their privacy and biometric data on social media.
""The disciplinary regime only relied on demographic information for biopolitics. In contrast, the *information* regime has access to psychographic information that it uses for its psychopolitics" [1] (Han, 2022, p. 26).
As we can see, objective changes are significant and not just positive, and it is crucial to pay close attention to the negative impacts of technological transformations. Beyond the easily identifiable objective changes we mentioned earlier, we are witnessing major shifts in intersubjective and subjective realities. The fiction that governs human cooperation has changed primarily in terms of scale. We have embraced some sort of global cooperation. Obviously, Western governments and large companies have been doing this for decades, or, more loosely, the Western world has been doing it for centuries, since the Discoveries. However, the intersubjective scale has expanded to encompass every individual through the use of the internet. It's possible to find love anywhere in the world on a dating site or social network, just as we are no longer dependent on village supermarkets to buy smoked herring. This change is both incredible and terrifying because of its scale and the widening of our scope of action. Boundaries are, by definition, the practical result of the authority that defines these limits (Bourdieu, 1989, pp. 113, 114). If the boundaries expand, so does the space for action, and authority dissipates. Who is the authority in the digital world? Its apparent absence will also profoundly alter my subjective reality, my sense of obedience or freedom. On the other hand, these interactions will profoundly alter fictions, narratives or intersubjective realities.
According to Han, there is an objective change that will have the most disturbing impact on how we understand the world and ourselves, i.e., on other realities. At the beginning of this new phase, at the dawn of the millennium, there were aspirations for real-time democracy based on the direct participation of all citizens. Software was even created for this purpose, LiquidFeedback for instance, however, "communication on social networks, based on algorithms, is neither free nor democratic (...).
The smartphone, as a device of submission, is far from being a mobile Parliament. It accelerates the disintegration of the public sphere by ceaselessly publicizing private elements, like a mobile shop window" (Han, 2022, p. 32). According to Han, digital networks lack the necessary amphitheatrical structure of previous media, which were capable of aggregating relevant topics and converging society's attention. On the contrary, digital networks enable "the public sphere to disintegrate into ephemeral, interest-driven swarms. *Information* spreads without being filtered by the public space. It is produced in private spaces and transmitted to private spaces"[2] (Han, 2022, p. 32). Consequently, the internet will not generate a public sphere. The absence of broad and stable public spaces will likely become a reality. Also, the absence of the thought of the other, as referred to by Hanna Arendt, will be inevitable for the existence of a democracy (Arendt, 2005) that relies on discourse which, by definition, is characterized as "a back-and-forth movement. (...) Only the voice of the other gives a discursive quality to my (...) opinion" (Han, 2022, p. 33).This absence of the other will eliminate discourses, thereby eliminating the ability to build communities and ultimately eradicating communicative action. This transformation will prove to be more objective than one might initially think, and it will also be crucial for the creation of intersubjective realities over which communities will have no action: influencers will be responsible for training the consumerist herd that finds itself devoid of a discursive role. The intersubjective reality, the fiction that we have been weaving for the last 30 years, has suffered from this upheaval. On the one hand, there are still remnants of the disciplinary regime described by Michel Foucault, on the other hand, we face a new infocracy emerging from the new dataism, as described by Byung Chul Han. In the first model, the capitalist culture of work, of "docile herd", still persists, with people being constantly monitored and integrated into the productive machine. In the second model, which is gaining increasing prominence, coercion or surveillance no longer exist and work is expected to be completely replaced by machines in the near future. Individuals are not coerced; instead, they willingly expose themselves according to the ideals of transparency. "The paradox of the information society lies in the fact that human beings are prisoners of information. They shackle themselves by communicating and producing information. The digital prison is transparent"[3] (Han, 2022, p. 13). These overlapping fictions are, therefore, paradoxical. The main epithet bestowed upon 21st century humans is all too instructive: consumers. To consume means to make disappear, to erase. A society that incessantly speaks of the future while being driven by a constant need to erase or consume, is in itself a paradox. Disappearance contradicts the notion of continuity.
This has been the keynote of the last 30 years: a paradoxical social development that keeps allowing for gigantic changes to coexist alongside lifestyles that are more than 60 years old. Naturally, this paves the way for major changes to occur without citizens having a clear perception of these changes.
Global geopolitical dynamics have shifted in the last five years, ensuring the predictable hegemony of China and the reorganization of powers. However, mainstream analysts, whose role is to delve into world conflicts and tensions, insist in personalizing them and attributing responsibility to their leaders, while upholding the narrative of the superiority of the West, at a time when India, China, Russia and Brazil are becoming

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technological giants and collectively account for almost half of the Earth's population (with over 3 billion inhabitants). Along the way, the capacity for a comprehensive analysis of a globalized world is getting lost, and we persist in fictions that are ill-suited to objective reality.
This paradoxical structure is the perfect container for abrupt changes to occur, often without clear notice from the majority of global inhabitants. In fact, we are witnessing a paradigm shift occurring at a faster pace than anticipated. In today's global economy, the most valuable raw materials are data, especially consumer data. Through this data, it becomes possible to generate political outcomes more effectively than from cohesive ideologies.
According to Byung-Chul Han, liberal democracies are giving way to a novel form of organization typical of the information regime: infocracy. In this regime, the liberal values of equality, fraternity and freedom are being replaced by a new value: freedom of information. The same cold, computerized information we discussed earlier. It is not about freedom of expression for individuals, but rather the freedom of data circulation, and the "flow of *information*"[4] becomes increasingly vital (Harari, 2021, p. 426). This value is so prominent that it became the foundation of the term dataism, first coined by David Brooks in 2013 in the New York Times and further developed by Harari, who defines it as the ideology succeeding humanism. We can briefly characterize the premises of Dataism by drawing on the following quote from Alex Pentland:

> Within a few years, we will possess detailed and available data on the behaviour of almost the entire human population - and, moreover, uninterrupted. (...) And only by developing an accurate visualization of the pattern of human life can we aspire to understand and control our modern society in a way that is better suited to our complex network of humans and technology" (Pentland apud Han, 2022, p. 48).

For the first time in the last 200 years, the humanistic ideals of the French Revolution seem to have found a possible successor. This change has been taking place while democracies are declining and technology is accelerating. The elections that brought leaders like Trump or Bolsonaro, and the "Yes" vote in Brexit are already clear signs of democratic setbacks against the ascension of the new infocratic regime.
The question that often overlooked is "why"? Why should we move towards a potential new prison that will distance us from ourselves?

Conclusions and expected scenarios
First and foremost, it's important to realize the irreversible path of technological development. Chomsky and Harari affirm this reality, with the former stating that "it is impossible to stop the systems" (Pequenino & Neto, 2023) while the latter claims that "nobody knows where the brakes are" (Harari, 2021, p. 64). According to Harari, this process and its acceleration stem from the inevitability of economic survival. "To survive, the modern economy needs constant and permanent growth" (Harari, 2021, p. 64). According to this author, if current societies abandon this principle, the capitalist economy will collapse. Even in the absence of new resources or the depletion of the planet's habitability conditions, the heralds of the capitalist economy maintain a believe that science will always find a solution, constantly rejecting any essential principle other than growth. We can therefore assert that this technological evolution results from the funding driven by the need for growth advocated by the major economic forces.
On the other hand, the Western analysis of economic growth has insistently been approached from a Western perspective. However, evidence points to a significant global shift that occurred in 2013. China is said to have changed course by creating new strategies aimed at achieving economic growth, thus reinventing the rules of the geopolitical game and contributing to the unbalance of 20th-century hegemonies. "Instead of continuing to follow in the footsteps of American companies or simply copying them, Chinese entrepreneurs began to develop products and services that bear no resemblance to those created in Silicon Valley" (Lee, 2019, p. 33). This new balance of power is already causing ripples across the world's most powerful economies, reconfiguring them and establishing new alliances. This represents an unprecedented technological leap that will generate impacts on a large scale. We are not merely talking about the already famous chatbots that we have used earlier in our text, but rather the lesser-discussed use of advanced deep learning systems, massive systems for collecting and processing data on a global scale, and the widespread operation of societies and their essential mechanisms (economy, politics, transportation, communication, etc.) based on algorithmic mechanisms owned by large global corporations.
One of the scenarios that can be anticipated from this technological leap can be described in the words of Kai-Fu Lee, who highlights the evolution towards and through artificial intelligence (AI):

> The AI world order will combine winner-takes-all economics with an unprecedented concentration of wealth in the hands of a few companies in China and the United States. This, I believe, is the real underlying threat posed by artificial intelligence: tremendous risk of social disorder and political collapse stemming from widespread unemployment and gaping inequality.
> The upheaval in job markets and disturbances in societies will occur within the context of a far more personal and human crisis - the psychological loss of our meaning of life. (Lee, 2019, p. 38)

The author alludes to the loss of meaning resulting from the elimination of our role as workers and work as a guarantor of existential meaning, a connection that has existed since the agricultural revolution. The most probable scenario will therefore be a dramatically less egalitarian society whose existential meaning will be seriously compromised. The dramatic lack of timely reflection on this matter has led societies and their leaders towards dynamics meant to maintain the previous paradigm when, in fact, the paradigm has already changed. Proclaimed transparency is already one of the values of the dominant infocracy, while connectivity is already the massive acquisition of data within this regime.
A word is due to address possible short-term social alternatives. All of them revolve around education for the new paradigm. This education must start, first and foremost, with educators and then this knowledge should be disseminated across as many social sectors as possible. Academia will play an essential role in this endeavour by being able to exist independently of the major global corporations, at least in countries enjoying a state-funded higher education system, like Portugal. There will be an urgent need for collective and individual preparation to properly use the appropriate digital tools to guarantee social existence itself.
This process could lead to a reduction in dependence on mainstream commercial digital system solutions. There is no valid reason for an independent state and its agencies to operate relying on commercial

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digital tools when open-source software possibilities exist or can be created. It is urgent to recognise that, with every digital interaction, we are voluntary handing over our most valuable asset: data. As long as there are no regulations for the monetization of this data, we must fully understand its value.

In accordance with the principles of free software, when we prioritise convenience over freedom, we are teaching people not to value freedom. Whenever a user's search is communicated to a company, we are supporting a culture of data capture that does not serve the value of freedom but rather the idea of financial growth (Stallman, 2022) which, in our view, is not a value, but an ideological assumption of a paradigm that transforms us into what Han defines as "data and consumer herd" (Han, 2022, p. 9).

It is a critical time where we have to make thoughtful decisions and choose how we want to think.

In this sense, humanistic academia should adopt a strategic action to provide an educational response that goes beyond the mainstream business world, through monitoring, critical reflection and dissemination of the discussions on infocracy and the ascent of dataism.

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