



VersOnLIFE: an Inventive-Connective Methodology for OnLIFE Education in Metaverses

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Abstract. The digitization, datification, algorithmization, sensorization, and connectivity of the world produce hybrid and hyperconnected realities, impacting ontological, anthropological, sociological, and epistemological levels, transforming different contexts of society. However, in the field of Education, educational paradigms based on an anthropocentric view of the world, in pre-digital epistemologies, theories, and methodologies, hinder the emergence of new digitalities. From this context arises the problem: "How do Metaverses contribute to the invention of methodologies in the OnLIFE Education paradigm?" The aim is to present VersOnLIFE, an inventive-connective methodology co-created within the triad of Research-Development-Training in International Research Group Digital Education - GPe-dU, in dialogue with the research developed in International Research Center Atopos-USP. The methodology, grounded in Relational and Connective Epistemology and guided by the theory of Inventive Learning in Transorganic Connective Action, hybridizes two main approaches to the Metaverse, drawing on elements present in the Cartographic Method of Research-Intervention, gamification, and generative artificial intelligence. The relevance of VersOnLIFE lies in its approach, embedded in a connective ecological perspective, involving human and non-human entities, in an inventive hybridism of spaces, times, technologies, presence, modalities, cultures, and intelligence. Thus, supported by the OnLIFE Education Paradigm, it contributes to connective pedagogies in the context of developing hyperintelligences.

Keywords: OnLIFE Education, Metaverse, Augmented Reality, Pedagogical Practices, Artificial Intelligence.

1 Introduction

The process of digitization and the expansion of connectivity provoke significant transformations in society, including the way we learn and teach. In this context are the various digital technologies and platforms, which challenge communication methods and foster the emergence of new communicative architectures.

These complex communicative architectures enable the construction of connective ecologies and environments by connecting things (Internet of Things - IoT), data (Big Data), biodiversities, and territories (sensors, satellites), which facilitates the emergence of hybrid and hyperconnected realities. This challenges educational paradigms based on an anthropocentric view of the world, as well as the epistemologies, theories, methodologies, and practices of a pre-digital era.

Understanding this hybrid and hyperconnected reality implies inhabiting it, to build new frameworks and achieve the necessary epistemic shift of connectivity in education, supported by the Paradigm of OnLIFE Education. It is precisely in this inhabitation that the problem arises, giving rise to the article: "How do Metaverses contribute to the invention of methodologies in the OnLIFE Education paradigm?"

The aim is to present VersOnLIFE, an inventive-connective methodology co-created within the triad of Research-Development-Training in International Research Group Digital Education - GPe-dU, in dialogue with the research developed in International Research Center Atopos-USP

2 Literature Review

2.1 The Technological Genius Loci: Digital Communicative Architectures and the Communicative Forms of Inhabiting

Historically, the main theoretical approaches to communication have contributed to the conception of interactions developed through exchanges of messages and content between humans and media, that is, between senders, channels, content, and receivers. [1], in his work "Speaking into the Air," he distinguishes two main models that characterize the Western idea of communication: dissemination and dialogue. The first would be the communicative form of Christ, who disseminates the truth, and the gospel; the second would be the practice of maieutics developed by Socrates, which produced content through conversations, the continuous reformulation of questions and answers between two or more interlocutors.

The recent evolution of digital media has shown the emergence of much more complex communicative architectures capable of constructing ecologies and connective environments formed not only by senders, content, channels, and receivers. In addition to the expansion of forms of connectivity that, after connecting computers and humans, began to network things (Internet of Things), data (Big Data), biodiversities, and territories (sensors, satellites), creating a "network of networks" and an internet of all things [2], [3], [4], [5], the development of metaverse platforms, augmented realities, and various types of virtual environments has given rise to connected environments capable of creating and determining the format, types, and qualities of interactions within their realms [6].

This qualitative change suggested a theoretical effort to rethink the format of communicative practices from a perspective that is no longer anthropocentric and techno-instrumental. Various studies on platforms, blockchain, and metaverses [3], [7], [8], [9], highlight the ecological format of these architectures that produce communicative interactions only after entering and beginning to inhabit them. Similar to an ecosystem, these architectures begin to produce not only exchanges of content and interactions but also form a habitat capable of shaping and characterizing the qualities of their members and parts [9].

Rethinking communicative processes from an ecological perspective, capable of describing the complexity of these new architectures, means, on one hand, considering the progressive process of digitization of the environment, territories, and physical spaces, and on the other hand, how the emergence of these environments—both physical and digital simultaneously—has altered our living conditions and our idea of communication.

As briefly presented, through the digital transformation of territory and the environment, alongside the second aspect, the alteration of our living conditions and our own idea of communication allows us to reconstruct, albeit briefly, a historical tradition that presents us with the technological and hybrid dimension of the environment and our forms of communicative and technological practices. One of the first authors to elucidate the process of hybridization and reciprocal alteration between individuals, technology, and the environment is [10], who, in his work titled "The Work of Art in the Age of Mechanical Reproduction," describes the advent of photography and cinema:

Our taverns, the streets of our metropolises, our offices and furnished rooms, our stations and factories seemed to close off irreparably. Then came cinema, and with the dynamite of tenths of a second, it blew this world apart like a prison; thus we are now able to undertake adventurous journeys among its scattered ruins. With the close-up, space expands; with the resumption of slow motion, movement expands. It is understood how nature that speaks to the camera is different from that which speaks to the eye [10, p. 41].

A second author who introduced the perspective of a technologized environment and a hybrid inhabiting produced by the interactions between individuals, technology, and environment is McLuhan [11]. In describing the transition from orality to writing technology, he highlights the change not only in communicative modalities but in the very relationship between them and the environment:

The literate and civilized man tends to restrict space and separate its functions, while the tribal man freely projects the form of his body to contain the universe. (...) For the tribal man and the non-literate society, inhabiting was an image of both the body and the universe. The construction of the house, with its hearth and fireplace, was ritually associated with the act of creation. (...) Having accepted a fragmentary

analytical technology, the literate man does not find access to cosmic structures as easily as the tribal man. He prefers separated and compartmentalized spaces to the open cosmos [11, pp. 145–146].

The conception of a hybrid interaction between people, environment, and technology finds, in more recent times, contributions such as those from Meyrowitz [12], who, in describing the nature of social situations, criticizes the conception that viewed it as the result of relationships between the individual and the physical environment. For [12], the arrival of communicative technologies would have transformed the nature of interaction, qualitatively altering the relationship between people and physical space:

New media produce new types of relationships between people and the environment (...) The nature of interaction is not determined from the physical environment as such, but from models of informational flows (...) Likewise, social interaction and behaviors within society can be modified by the introduction of new communication media (...) The concept of informational systems indicates that physical environments and the 'environments' of media belong to a continuum and not a dichotomy [12, pp. 60–61].

The hybridization between environments, technologies, and the qualities of human relationships, as well as the perspective of a technological social situation, has made it possible to formulate the idea of a “technological *genius loci*” [13], that is, the technological creation of space and its specific forms and modalities of habitat. If, as analyzed by Benjamin [9], the communicative experience can be identified with the loss of *hic et nunc* and the sense of place [9], with the advent of platforms, geographic information systems, and the metaverse, communicative practices become a lived experience, that is, the result of connectivity between informational architectures, territories, and people, capable of redefining the experience of place and the condition of its members.

The shift from the idea of communication as the transfer of information to the conception of communication as inhabiting finds inspiration in the concept developed in various parts of Heidegger's work (1977). In particular, the German philosopher, while explaining the relational ecology of being, which is only while inhabiting under the sky, on the earth, alongside the divine and near the mortal, through a particular “uniqueness” that makes the same being a “being-there” (*dasein*), defines inhabiting as the result of multiple communicative interactions that change over time, following the emerging character of the quadrature (*Geviert*). Although the communicative dimension is not the central focus of Heidegger's thought, it is possible to see, in this non-ontological but relational and emergent dimension of being, an important metaphor for analyzing the condition of a connected, ecosystemic, and digitally produced inhabiting, characteristic of contemporary connective architectures.

The elaboration above provides elements that allow us to understand that physical and digital environments simultaneously alter our living conditions and the very idea of communication. Thus, we understand that metaverse technology, in its two hybridized approaches (which implies connectivity between informational architectures, territories, and people), enables a redefinition of the experience of place and the very living condition of teaching and learning, which requires new methodologies and practices in a context that is one of forming connective ecologies.

2.2 The Habitats of Teaching and Learning in Metaverses

The idea of Metaverse, where “Meta” means to go beyond, to transcend, and “verse” is an abbreviation for universe, although not yet named that way, emerged in 1984, in the science fiction novel entitled “*Neuromancer*”, by William Gibson, in which the author also introduces the term avatar. In 1992, influenced by Gibson, Neal Stephenson published “*Snow Crash*”, where he used the term “metaverse” for the first time to describe a fictional virtual environment inhabited by people, represented by avatars. The term “avatar”, although popularized by science fiction, derives from the Sanskrit - *avatarā* and has its origins in Hinduism, referring to the earthly manifestation of divinity.

In the context of digital technological development, the origin of metaverse technology dates to the mid-1970s, with the emergence of the first multi-user textual virtual digital worlds, known as Multi-User Dimension or Dungeon (MUD), which in 1990, based on the possibility of creating programmable rooms and objects, evolved into Object Oriented MUDs (MOOs). In 1993, with the creation of the Virtual Reality Modeling Language (VRML), the first graphical front-ends were developed, giving rise, in 1995, to the first educational MOO – Diversity University.

This path of digital technological development gave rise, in 1995, to the first platform for 3D Virtual Digital Worlds - MDV3D, the Alpha World, popularized in 1997 with the launch of Active Worlds, which allowed the construction of MDV3D [9], [14], [15], [16]. This context constitutes the first generation of Metaverse technology, conceptualized as dynamic, multi-user and persistent systems, created in 2D or 3D, and which change in real time as avatars interact with them [14].

Later, with the evolution of hardware, especially graphics cards, the expansion of computing capacity and the popularization of the internet, different games, applications and 3D metaverses began to emerge. However, metaverse technology only became popular in 2003, with the creation of Metaverse Second Life - SL by the North American company Linden Labs. Thus, in 2006, the GPe-dU UNISINOS acquired an Island (server space) in the Metaverse Second Life and created UNISINOS Island and, in 2007, RICESU Island, which hosted 15 religious universities in Brazil. Both UNISINOS Island and RICESU Island developed numerous projects within the scope of the research-development-training triad. Continuing the development of metaverse technology, in 2017, Linden Labs launched Sansar, an engine that makes it possible to produce content, games and experiences for Virtual Reality (VR) glasses.

The popularization of the Second Life Metaverse, the emergence of open-source platforms (including OpenSimulator in 2007, which created the GPe-dU World and hosted research developed by different universities in Brazil) and the emergence of integration with VR headsets, constitute the second generation of metaverse technology development, which is now inhabited by researchers from different areas of knowledge and places in the world. It is important to note that some metaverse platforms, both from the first and second phases, have sandbox functionality and persistence characteristics. While the first allows 3DMDVs to be created and co-created in a network, the second is responsible for maintaining what has been created, allowing the construction to continue. Some of these platforms also provide a variety of options that allow humans, embodied by avatars, to create and co-create different 2DVDs or 3DVDs that can be either a representation, simulation, interpretation, or an online invention, thus producing Virtual Reality Experiences (VRE) and Real Virtuality Experiences (RVE), in a navigable and habitable universe, capable of enhancing the feeling of immersion with VR devices [17].

Although metaverse technology (understood as open world platforms) has not been effectively appropriated and popularized in Education, GPe-dU has been working with research-development-training on different platforms since 1999, with the aim of better understanding: how knowledge is given in 3DVDs and how they enhance new habitats for teaching and learning.

Three decades after the emergence of the first metaverse platforms, the Covid-19 pandemic and the announcement by Facebook (Meta) of a multi-million-dollar investment in the creation of a new metaverse that incorporates wearable devices, such as glasses and sensitive gloves, have brought this technology back into the spotlight. Other large companies such as Microsoft, Niantic and an entire business ecosystem focused on the development of gaming technologies in particular have begun to publicize projects related to technology. This movement, now in a different context of technological development and connectivity, with wearables, eXtended Reality – XR (Virtual Reality, Mixed Reality and Augmented Reality), sensors, geolocation and 5G and 6G connections, gives rise to a third generation of metaverses.

A new definition of metaverse thus emerges - the Metaverse of "Real" Life, which we understand to be a second approach to the technology that makes up this third generation of metaverses. In this approach, the metaverse is understood as a system that inputs digital elements, through Augmented Reality and Mixed Reality, into physical geographic spaces that humans inhabit, enhancing and expanding the experience with/in the world itself [9]. This approach has been investigated in GPe-dU since 2014, when we created the Alternate Reality Game (ARG) Ghost in the Museum, in 2016 with the creation of the Obsidian Catch app e do Mobile, Ubiquitous Pervasive Extended Reality Game MUP-ERG In Vino Veritas® and, in 2017, with the creation of the Ágora do Saber. This leads us to question: What differentiates the current metaverses from the previous ones?

According to [18], current metaverses differ in three aspects: 1) the quality and recognition of language, as well as the development of generative models, enabled by the rapid evolution of deep learning, which contributes to the creation of more immersive environments with more natural movement; 2) access from mobile devices connected to the internet at anytime, anywhere; 3) the coding of the program in the metaverse world itself and the possibility of having a more effective connection with the "real" world, through the development of virtual currency and other elements. It is important to note that metaverse technology expands according to the different social meanings it acquires. Cryptocurrencies such as Dime, for example, serve as an economic bridge between the metaverse and the real world, giving people a deeper social meaning [9].

Although metaverse technology, in its first approach, was most often used for reproduction, simulation of the "real" world, creating digital twins of spaces and avatars; It has the potential to create new spaces, distinct from those existing in physical geography, and to expand and create new forms of identity and social experiences. This allows us to advance the way we understand the world, society and the way we experience it.

The hybridization of the first metaverse approach with the second metaverse approach gave rise to a broader conceptualization of the metaverse, which is expressed as follows by [9]:

Metaverses are ecologies that have a binding architecture, but depend on interactions between XR technologies, wearable devices, software, and people, and that transform human experiences, altering the level of perception, ways of feeling, and living conditions, changing in real time as the various entities interact with each other [9, pp. 13–14].

It is essential to note that, in the context of Education, it is not a matter of "using" metaverses as a tool, means, resource, or support to reproduce the fields of universities and the spaces of cities, with researchers, teachers, and students being mere users and consumers of technology, which [9], [19], [20] refer to as a first level of familiarization with technology.

3 VERSOnLIFE: an Inventive-Connective Methodology

It is necessary to move towards the appropriation of this technology, as a technology of intelligence, since it has the power to expand, externalize and modify human cognitive functions [21], which allows researchers, teachers and students to also be producers, from a perspective of empowerment. This intermediate level implies overcoming the perspective of "using" technology as a "tool, resource, means, support".

At a higher level is invention, from a perspective of coupling and mutual agency, between humans and technology, which implies understanding this technology as a living condition and environmental force, by problematizing who we are, how we relate, how we understand the world and how we interact with it. Due to the specific properties of this technology, it is possible to create an avatar completely different from the appearance of the physical "I", and it can assume any fictional form (robot, furry, fairy...), the hybridization of these or whatever the inventive process provokes.

The research-development-training triad movement in GPe-dU co-engendered the two metaverse approaches, elements present in the cartographic method of intervention research [22], [23], elements present in gamification [24], [25] and different Generative AI in the creation of an inventive methodology [26], [27], called VersOnLIFE [28], [29], "verse" - suffix of metaverse and "OnLIFE" of the OnLIFE Education paradigm.

In short, unlike active methodologies, which are based on interactionist epistemologies, are guided by a theory of action and are focused on problem solving; Inventive methodologies are based on reticular and connective epistemologies [30], [31], are guided by the transorganic connective act [32] and are focused on the invention of problems. In inventive methodologies, learning is understood as a transorganic inventive process, therefore, which is constituted in a path of *invenire*¹, in connective acts between humans and non-humans (understanding that gives rise to the Theory of Inventive Learning in Transorganic Connective Act - TAI-ACT) [29], [33]. In this way, not only the process is inventive, but also the product produced in the path, which is understood as a third that emerges in a hybridism.

The OnLIFE Education Paradigm [34], [35], [36] understands Education as connected (On) in life (LIFE), since the teaching and learning processes emerge from problematizations of the world, in the present time and develop in an ecology that connects humans and non-humans, in an inventive path. These problematizations are understood as forces of the present, therefore, of a moving world and in an accelerated process of transformation into a hyperconnected reality, resulting from the hybridization of the physical world, the biological world and the digital world. In this reality, knowledge, by constituting connective acts between humans and non-humans, overcomes both the dualistic perspectives that work with the binomials subject-object (S-O), individual-environment (I-MA), organism-environment (O-M), human-technique, human intelligence-artificial intelligence; as well as the understanding of knowledge as a representation of a world external to the subject or even as a representation internal to the subject, typical of a theory of action, centered on the human [27], [29]. Thus, in addition to being hybrid and multimodal, education in the OnLIFE Education paradigm is transubstantiated, ecological-connective and inventive, contributing to overcoming an anthropocentric and dualistic view of the world.

It is in this context, as an inventive methodology that emerges in the OnLIFE Education Paradigm, that the inventive-connective methodology VersOnLIFE (see Fig. 1) is constituted by hybridizing:

- the two approaches to metaverses (as explained above);
- elements present in the cartographic method of intervention research [22]: the metaphor of clues, the movements of the cartographer's attention (tracking, touching, landing and attentive recognition), the creation of an existential territory, the perspective of inhabiting an existential territory that is atopic, the interventionist assumption, the assumption of learning as the invention of problems (experience of problematization, cultivation of "supplementary" attention, to duration – attentive recognition of a context), the field of forms and collectives of forces and the assumption of monitoring the path;
- elements of gamification from the perspective of empowerment [25]: organization by guilds or clans, clues (live, geographic, online), narratives, missions, challenges, puzzles, easter eggs, collectible items, achievements;
- generative artificial intelligence.

¹ *Invenire*, a Latin term, implies composing with archaeological remains, mining, resulting in something unpredictable and leading to problematization.

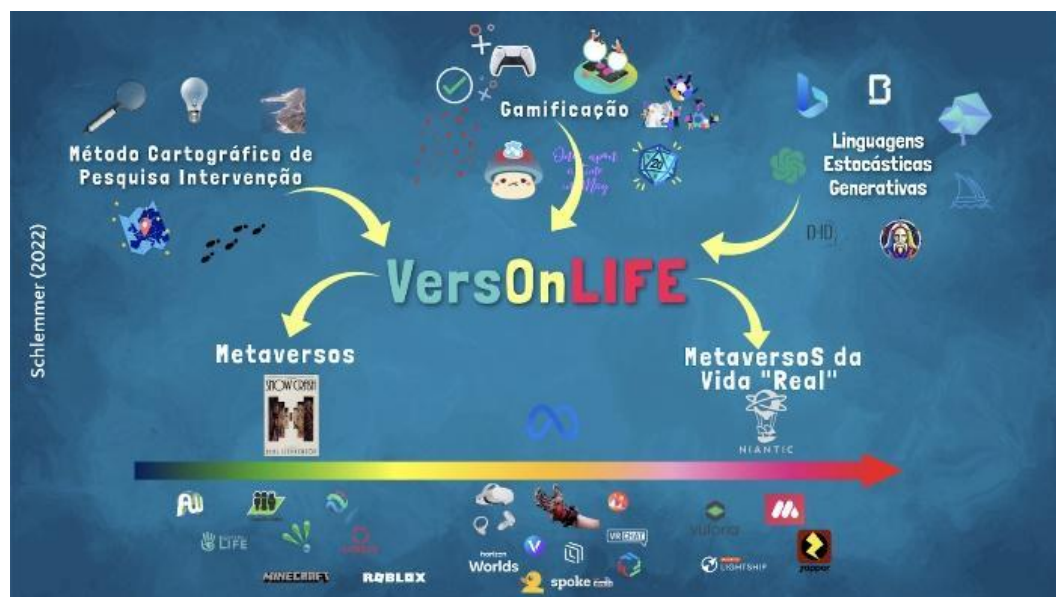


Fig. 1. VersOnLIFE Inventive-Connective Methodology.

This inventive-connective methodology has contributed to the co-creation of several formative practices and experiences within the scope of OnLIFE teaching at different educational levels, one of which is presented below.

4 From the VersOnLIFE Inventive-Connective Methodology To Practices That Enhance Immersive Experiences

The previously explained VersOnLIFE inventive-connective methodology has supported the development of different SaLGOn pedagogical practices (Sympoietic, Inventive, Gamified and OnLIFE), which enhance immersive experiences, one of which is presented below.

Entitled “Life and work of Santo Inácio de Loyola: the Inaciana Pedagogy”, the practice aimed to provide higher education teachers with an immersive learning experience with metaverse technology within the scope of training in connected ecologies. To this end, the practice was developed based on the appropriation of the VersOnLIFE inventive-connective methodology, which involved, as elements present in the cartographic method of intervention research [22]: tracking, touching, landing and attentive recognition, clues, the field of forms and collectives of forces and the monitoring of paths; as elements of gamification from the perspective of empowerment [26]: narrative, character, mission, challenges, puzzles, live clues, online clues, geographical clues, in a proposal that hybridized:

- the Metaverse technology (Second Life), the Jitsi web conferencing platform, the Metaverse application, Adobe Fuse, YouTube, Canva and Google Earth,
- the physical-geographic spaces of the Universidade do Vale do Rio dos Sinos - UNISINOS, University library and 3D modeled spaces, which constitute UNISINOS Island, co-created in the Metaverse Second Life,
- synchronous and asynchronous times,
- physical presence, digital presence by avatar and telepresence by webcam, which are related to the presence of the human, with the presence of a character (Santo Inácio de Loyola),
- the forms of communication: textual, oral, gestural and graphic, the physical and online face-to-face modalities (mobile learning, pervasive learning, ubiquitous learning, immersive learning, gamification learning).

The practice was co-created by a group of seven people (three master's students, one doctoral student, one postdoctoral researcher, one scientific initiation scholarship holder and the coordinating researcher) and developed in the context of higher education teacher training. It involved the co-creation of the Metaverse Second Life, in which the challenges were created for the group of teachers who were inhabiting the Island; Adobe Fuse for 3D modeling of the character Santo Inácio de Loyola; Google Earth, to travel with Santo Inácio de Loyola along the path he had taken from Spain; Canva, where the artwork for the videos of the clues and for the Augmented Reality markers were created; YouTube, where the video clues were posted; the Metaverse - Augmented Reality application, which allowed the reading of QR Codes and presented Augmented Reality; the Metaverse - Augmented Reality application studio, where the AR was created; the Jitsi communication platform, which

enabled constant connection between the group of teachers who were living in UNISINOS Island and those who were living in the physical-geographic space of the Library. The QR Codes with the clues were entered both in the physical geographic space of the Library and in the spaces of UNISINOS Island. This dynamic can be identified in Fig. 2.



Fig. 2. VersOnLIFE Santo Inácio de Loyola: the Inaciana Pedagogy.

To support the teachers who participated in the experience, a guiding material was created on the technologies that were hybridized in the SaIGOn practice, developed from the perspective of the inventive-connective VersOnLIFE methodology. This material was previously shared as an asynchronous activity so that the participants could learn about and inhabit the hybridized technologies. The experience was carried out synchronously, with 28 teachers from different areas of knowledge: 13 with a physical presence in the physical geographic space of the UNISINOS Library and 15 with an avatar presence in the Metaverse Second Life, in addition to the 7 who idealized the practice, three of whom were physically present to coordinate and guide the development of the experience in the physical-geographic space of the UNISINOS Library and four were present via avatar in UNISINOS Island to assist in the other environments that were inhabited. Everyone was also in Jitsi.

The physical space of the UNISINOS Library hall was chosen because it features paintings that portray the history of Santo Inácio de Loyola, aligned with the history of the university. From this context, a narrative was developed with the character Santo Inácio de Loyola, and the Inaciana Pedagogy.

The experience featured the character Santo Inácio de Loyola who communicated with teachers through text, audio and video, challenging them to explore the different works of art² (hand-painted panels that tell the story of Santo Inácio de Loyola's life and work) displayed in the physical geographic space of the library hall, as well as 3D modeled spaces in UNISINOS Island, in search of clues (produced on video by a professor-researcher from the PPG of Philosophy, who is also Jesuit Priest) and hidden challenges. In the physical geographic space of the UNISINOS Library, the character emerged in Augmented Reality, from the reading of QR Codes assigned to the works of art and, in UNISINOS, from QR Codes assigned to different 3D modeled spaces, which were linked to the works of art and by the narrative. The clues provided by the character in one of the spaces helped solve a challenge, generating information that served as a clue for the other space, thus establishing the gamified dynamics of the experience.

While in UNISINOS Island the challenges referred to Inaciana Pedagogy, in the physical geographic space of the Library hall, the challenges referred to the story of Santo Inácio de Loyola's life and work, represented in the works of art. In this way, the narrative was developed based on ten challenges, five for the group of teachers who were physically present in the physical geographic space of the Library and five for those who were present via avatar in UNISINOS Island. These ten challenges made up the mission: "Understand the life and work of Santo Inácio de Loyola, in relation to Inaciana Pedagogy, as well as re-signify it in Education of the present time". The time for each challenge was approximately ten minutes, between the search for clues, the reading of the challenge and the communication between the two groups, which occurred constantly through the Jitsi platform. While the group physically present in the library searched for and read the QR Codes, as well as carried out the challenge presented, the group that was in the metaverse, in UNISINOS Island, followed the video on Jitsi, until they found

² Paulo Porcella, 1999.

the clue to the next location that would need to be found in the metaverse to continue the experience. The same process occurred while the group in the metaverse carried out the challenge.

The experience, which lasted 2h16min, began with the group of teachers who were inhabiting UNISINOS Island in the Metaverse, who were challenged to locate a QR Code that had been hidden in the 3D modeled spaces that make up the Island. When reading the QR Code, the character of Santo Inácio de Loyola emerged in AR, introducing himself and beginning the narrative by situating his presence in the history of the institution. Next, he indicated a puzzle, which, when solved, indicated the first work of art located in the physical-geographic space of the library, where the second challenge was located.

In this way, the group of teachers who were physically inhabiting the library's geographic space were challenged to locate the first work of art that had been discovered by the group of teachers who were inhabiting UNISINOS Island. After locating and reading the QR Code, a 3D representation of Saint Ignatius of Loyola appeared in AR, sharing the part of his trajectory linked to the panel and indicating a new clue for the challenge that followed in the UNISINOS Island space.

In the UNISINOS Island space, one of the challenges involved integration with a Google Earth project, in order to challenge the teachers to retrace the trajectory of Saint Ignatius of Loyola regarding his pilgrimage from Barcelona to Jerusalem.

Another mechanic present in the UNISINOS Island housing was the presence of a living track, which helped the teachers, present as an avatar, in moving to different points and spaces modeled in 3D on the Island, which required learning other forms of movement such as flying and teleportation. One of the challenges, for example, was in the ECODI Inaciano space (see fig. 3), which could only be accessed by teleportation.

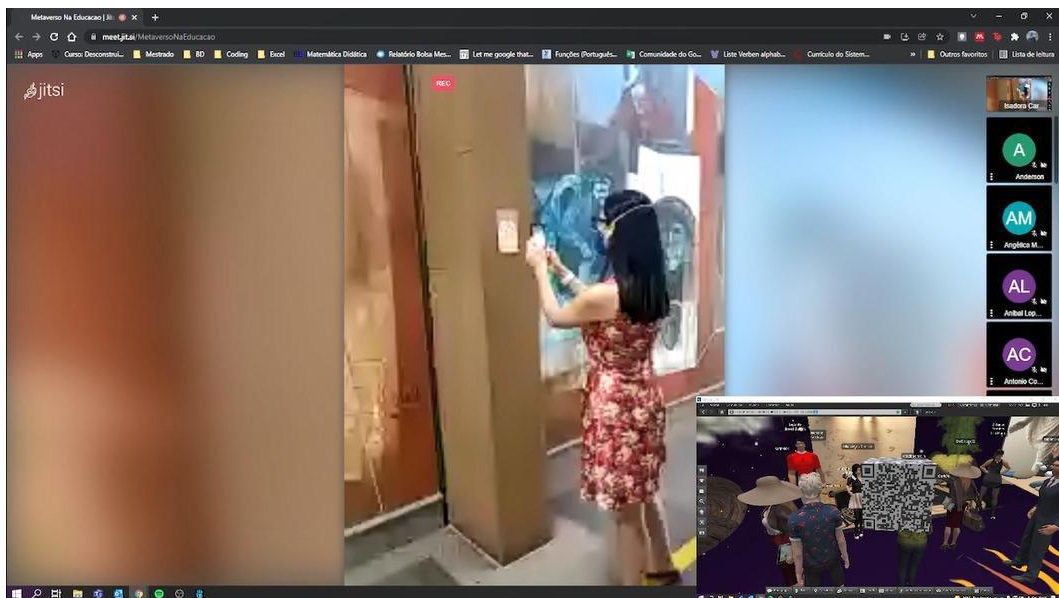


Fig. 3. AR QR Code reading in the physical-face-to-face environment and ECODI Inaciano.

In the physical geographic space of the Library, a central space was organized in which there were notebooks connected to UNISINOS Island in the Second Life Metaverse, a projection screen and projectors, so that the group of teachers physically present could follow the movement of the group of teachers digitally present via avatar in the spaces of the Island (see fig. 3).

The experience then developed based on clues and challenges interspersed in the physical geographic space of the Library and in the UNISINOS Island space in the Second Life Metaverse. Throughout the experience, communication between both groups of teachers was developed through Jitsi, in text, audio and video, allowing the clues found in both spaces to be shared between them. The experience provided:

- A new hybrid teaching and learning space, which involved the formation of a connected ecology, constituted by humans and non-humans, in different spaces, devices, technologies and digital platforms.
- An ecology of presence [37]: by involving different forms of human presence (physical presence, digital presence via avatar and telepresence via webcam) with the presence of a non-human (character in AR).
- A new way of inhabiting the spaces of teaching and learning, involving learning in movement, where teachers, in an ecology of presence, inhabited physical geographic spaces, virtual digital spaces and, simultaneously, both. In other words, different spatialities in the same synchronous time, experiencing the hybridization of spaces, presences, technologies, forms of communication, languages and breaking

with the dichotomy of inhabiting only the geographic space of the university, or the metaverse platform, or even the web conferencing platform, which allows us to refer to an atopic inhabitation [13] of teaching and learning.

- A high level of collaboration and cooperation among the participants, since in order to meet the challenges and fulfill the mission, it was necessary for the group of teachers who were inhabiting the UNISINOS Island to interact with each other and with the modeled spaces, in order to identify what the clue was, solve the challenge and inform the group of teachers who were inhabiting the physical geographic space of the Library. These, in turn, based on the information received, also interacted with each other in order to identify which clue the information indicated, find the clue in the physical geographic space, solve the challenge and inform the group of teachers who were living in UNISINOS Island and so on, until the mission was completed.

During the experience, the teachers demonstrated different levels of appropriation of the technologies, as well as engagement. While those who were more familiar and willing to learn had a significant engagement, expressed during the movement (in the physical-geographic space of the Library or in the UNISINOS Island space) in search of clues, completing the challenges and speaking when seeing the character in AR, others followed the groups with a certain distance.

This finding reflects the daily teaching and learning processes, since each individual has their own pace and learning process, which is related to the networks they have built in previous experiences and, in connection with different human and non-human entities, thus evidencing the unprecedented and unrepeatable nature of knowledge.

The integration provided by the mission and challenges (between the participants, physically present in the geographic space, and the participants, present by avatar in the metaverse and telepresent through Jitsi), which involved the search for clues, in both spaces (geographic and digital), which, when found, needed to be shared among the groups, so that they could continue the journey, kept the participants engaged and with their attention focused from the beginning to the end of the experience. Throughout the experience, the three professors who coordinated the experience carried out interventions and helped in the communication between the groups, participating in each challenge, however, without guiding or directing the groups, allowing a greater immersion in the narrative.

The formation of a connected ecology enabled the higher education professors to have a hybrid immersive learning experience by co-engineering: the Metaverse Second Life technology, the physical geographic space of the library; the Adobe Fuse software; Google Earth; the Canva graphic design platform; the video sharing platform; the Metaverse - Augmented Reality application; the Jitsi communication platform; the works of the Jesuit collection and; the people who developed and experienced the experience.

We understand that the experience developed satisfactorily, since all the challenges were met and the mission was completed. The participants, higher education professors, evaluated the proposal as powerful for the development of hybrid pedagogical practices, since the university was studying new pedagogical possibilities to be developed in courses in the hybrid modality.

The difficulties encountered in developing the SaLGOOn practice, supported by the VersOnLIFE inventive-connective methodology, were the need for a high level of appropriation of metaverse technology for modeling spaces and inserting challenges in QR Code with AR. It also required considerable time from the group of teachers who developed the practice, since four synchronous meetings lasting approximately two hours each were necessary for the development of the narrative, missions, challenges and clues, in addition to the asynchronous development of AR materials, 3D modeling, project in Google Earth, puzzle and the art created in Canva. Regarding the difficulties encountered in the experience, the following stand out: the difficulty of connectivity in the physical environment of the library and the compatibility of the AR Metaverse application, which presented instability on Apple devices.

5 Final Considerations and the Challenges of Education in a Context of Training in Connected Ecologies

The transubstantiation of the world and the communicational and epistemic transformations caused by the growing process of digitalization, datafication, algorithmization, sensorization and connectivity contribute to the emergence of increasingly hybrid and hyperconnected realities, which are constituted in a network and where everything communicates, thus overcoming an idea of communication that presupposes a sender and a receiver. This context configures the scenario in which the VERSOnLIFE Inventive-Connective Methodology emerges. This, in turn, subsidizes the development of SaLGOOn practices, which provide new habitats for teaching and learning, evidenced in the experience “Life and work of Santo Inácio de Loyola”, which is configured as a connective ecology, by co-engendering in a network, in a formation, not only humans, but physical-geographical

spaces, works of art, online spaces (two metaverse perspectives), NPC, QR Code, Augmented Reality, Google Maps and Google Earth, web conferencing application). The experience, beyond being a biological, physical and digital experience (BioFiGital), is constituted as a hybrid that emerges in a network, in the atobit connection, which allows us to speak of an ECO-Formative, inventive and immersive experience.

Therefore, returning to the problem that gave rise to the article: "How do Metaverses contribute to the invention of methodologies in the OnLIFE Education paradigm?" It's possible to say that metaverse technologies, from the two perspectives addressed, co-engineered with elements present in the cartographic method of intervention research, elements of gamification as empowerment and Generative AIs, enabled the creation of the VersOnLIFE Inventive-Connective Methodology. This, in turn, was appropriated in the development of a SaIGOn practice, which, based on the problematization of the world in the present time (in this case, how to resignify Inaciana Pedagogy in the Education of the present time?), hybridized technologies, spaces, times, presences, forms of communication, languages and modalities, in complex communicative architectures that enable the formation of connected ecologies (humans, territories, technologies, things, data).

In this way, it is understood that the methodology expresses the paradigm of OnLIFE Education, since it comprises practices and experiences that are not limited to the physical-geographical space of the classroom, but expand into hybridisms in network connectivity. Nor do they resemble the traditional concept of class, whose idea of communication is established in the sender-receiver logic and which is based on dualisms (subject-object, individual-environment, organism-environment, human-technique, human intelligence-artificial intelligence) and centralities (in the teacher, in the content, in the student), but based on the idea of networked communication, therefore, without dualisms and centralities, it constitutes itself as an ecology, which favors the atopic inhabitation of teaching and connected learning.

The objective of presenting VersOnLIFE, an inventive-connective methodology co-created within the scope of the Research-Development-Training triad in International Research Group Digital Education GPe-dU, in dialogue with the research developed in International Research Center Atopos-USP, was achieved, as evidenced in the construction carried out, which is based on Reticular and Connective Epistemology and guided by the theory of Inventive Learning in Transorganic Connective Act - TAI-ACT.

The VersOnLIFE Inventive-Connective Methodology, the SaIGOn practice, and the experience it provides highlight some of the challenges that constitute Education in this third millennium, including: the urgency of changing the current educational paradigm, which is guided by an anthropocentric view of the world; the need to build a new episteme, capable of overcoming theories of action that reinforce dualistic perspectives and centralities; and the fundamental shift from the logic of forming subjects, individuals, to the formation of connected ecologies.

These challenges highlight the emergence of a new cognitive policy in Education, which consequently refers to the paradigm of OnLIFE Education, which refers to an education that is connected, connected to life, so that the problematization of the world, in the present time, guides the teaching and learning processes. These, in turn, develop along an inventive path, from the perspective of the formation of connected ecologies (humans and non-humans), produced in the hybridism of spaces, times, technologies, presence, languages, modalities, cultures and intelligences (multispecies), which can contribute to the emergence of hyperintelligences.

References

1. Peters, J. D.: *Speaking into the Air*. The University of Chicago Press, Chicago (1999).
2. Di Felice, M.: *Do público para as redes: a comunicação digital e as novas formas de participação social*. Difusão Editora, São Caetano do Sul (2008).
3. Accoto, C.: *O Mundo Dado: Cinco Breves Lições De Filosofia Digital*. 1st ed. Coleção Cidadania Digital. Paulus Editora, São Paulo (2020).
4. Floridi, L.: *La quarta rivoluzione*. Raffaello Cortina Editore, Firenze (2017).
5. Santaella, L.: *Comunicação Ubiqua*. Paulus Editora, São Paulo (2013).
6. Schlemmer, E., Di Felice, M.: A qualidade ecológica das interações em plataformas digitais na educação. *Rev. Latinoam. Tecnol. Educ.* 19(28), 207–222 (2020). doi: 10.17398/1695-288X.19.2.207
7. Bratton, B. H.: *The Stack*. The MIT Press, Boston (2016).
8. Van Dick, J., Poell, T., de Waal, M.: *The Platform Society: Public Values in a Connective World*. Oxford University Press, USA (2018).
9. Di Felice, M., Schlemmer, E.: Ecologias dos Metaversos e Formas Comunicativas do Habitar, uma Oportunidade para Repensar a Educação. *Rev. E-Curric.* 20(4), 1799–1825 (2022). doi: 10.23925/1809-3876.2022v20i4p1799-1825
10. Benjamin, W.: *L'opera d'arte nell'epoca della sua riproducibilità tecnica*. Einaudi, Torino (1966).
11. McLuhan, M.: *Gil instrumenti del comunicare*. Il Saggiatore, Milano (1967).
12. Meyrowitz, J.: *Oltre il senso del luogo*. Baskerville, Bologna (1995).

13. Di Felice, M.: Paisagens pós-urbanas: o fim da experiência urbana e as formas comunicativas do habitar. 1st ed. Coleção Atopos. Annablume, São Paulo (2009).
14. Schlemmer, E.: ECODI – A criação de espaços de convivência digital virtual no contexto dos processos de ensino e aprendizagem em metaverso. Cad. IHU Ideias 6, pp. 1–32. (2008).
15. Schlemmer, E., Backes, L., Malizia, P., Moretti, G.: Comunidades de Aprendizagem e de Prática em Metaverso. 1st ed. vol. 1. Cortez, São Paulo (2012).
16. Schlemmer, E., Backes, L.: Learning in Metaverses: Co-Existing in Real Virtuality. vol. 1. IGI Global, Hershey (2015).
17. Schlemmer, E.: Laboratórios digitais virtuais em 3D: anatomia humana em metaverso, uma proposta em immersive learning. Rev. E-Curric. PUCSP 12, pp. 2119–2157. (2014).
18. Park, S.-M., Kim, Y.-G.: A metaverse: taxonomy, components, applications, and open challenges. IEEE Access 10, pp. 1–43. (2022).
19. Schlemmer, E.: Ecossistemas de Inovação na Educação na cultura híbrida e multimodal. Universidade do Vale do Rio dos Sinos, Porto, Relatório de Pesquisa (2020).
20. Schlemmer, E.: A pandemia proporcionou vários aprendizados. Rev. TICs EaD Em Foco 7, pp. 5–25. (2021).
21. Lévy, P.: As tecnologias da inteligência: o futuro do pensamento na era da informática. Editora 34, São Paulo (1993).
22. Passos, E., Kastrup, V., da Escóssia, L., Eds.: Pistas do método da cartografia: pesquisa-intervenção e produção de subjetividade. 4th ed. vol. 1, 2 vols. Sulina, Porto Alegre (2012).
23. Passos, E., Kastrup, V., Tedesco, S., Eds.: Pistas do método da cartografia: a experiência da pesquisa e o plano comum. 2nd ed. vol. 2, 2 vols. Sulina, Porto Alegre (2014).
24. Schlemmer, E.: Gamificação em espaços de convivência híbridos e multimodais: design e cognição em discussão. Rev. FAEEBA Educ. E Contemp. Online 23(42), pp. 73–89. (2014). doi: 10.2014/jul.dezv23n42007
25. Schlemmer, E.: Jogos e Gamificação: inventividade e inovação na educação? In: Andreoli, C. V., Torres, P. L. (eds.) Ciência, inovação e ética: tecendo redes e conexões para a sustentabilidade, 1st ed. vol. 1, pp. 241–267. SENAR, Curitiba (2021).
26. Schlemmer, E.: Projetos de aprendizagem gamificados: uma metodologia inventiva para a educação na cultura híbrida e multimodal. Momento - Diálogos Em Educ. 27(1), pp. 42–69. (2018). doi: 10.14295/momento.v27i1.7801
27. Schlemmer, E.: Metodologias inventivas na educação híbrida e OnLIFE. In: Educação digital, a distância e em rede digital, distance and network education, vol. 1, pp. 124–150. Universidade Aberta – Imprensa da Universidade de Coimbra, Lisboa/Coimbra (2022).
28. Schlemmer, E., Lehnemann, R. M., Silveira, C. S., Thomazzoni, E. S.: COVerso: uma organização cooperativa para a Educação OnLIFE em Metaverso (Multiverso). In: Theya Editores, pp. 109–110. (2022). [Online]. Available: <https://dspace.uevora.pt/rdpc/bitstream/10174/34578/1/Livro%20de%20resumos%20CiEECi%202022.pdf>
29. Schlemmer, E.: Metaversos e novos mundos numa ecologia de inteligências: o habitar da cidadania digital na educação onlife. In: Cidadania digital a conexão de todas as coisas, pp. 317–342. Alameda Casa Editorial, São Paulo (2023).
30. Di Felice, M.: Redes sociais digitais, epistemologias reticulares e a crise do antropomorfismo social. Rev. USP 22, pp. 6–19. (2012). doi: <https://doi.org/10.11606/issn.2316-9036.v0i92p6-19>
31. Di Felice, M.: Net-ativismo e ecologia da ação em contextos reticulares. Contemp. Comun. E Cult. 11(2), pp. 267–283. (2013). doi: <https://doi.org/10.9771/contemporanea.v11i2.8235>
32. Di Felice, M.: Net-ativismo: da ação social para o ato conectivo. 1st ed. Coleção Comunicação. Paulus Editora, São Paulo (2017).
33. Schlemmer, E.: O protagonismo ecológico-conectivo e a emergência das hiperinteligências no Paradigma da Educação OnLIFE. Cad. IHU Ideias Depois Intel. Artif. 21(348), pp. 53–83. (2023).
34. Moreira, J. A., Schlemmer, E.: Por um novo conceito e paradigma de educação digital OnLIFE. Revista UFG 20, pp. 2–34. (2020).
35. Schlemmer, E.: A UNIVERSIDADE NO PARADIGMA DA EDUCAÇÃO OnLIFE. 1st ed. Casa Leiria (2024). doi: 10.29327/5365072
36. Schlemmer, E., Moreira, J. A., Di Felice, M.: Desafios contemporâneos e a emergência da educação onLIFE. Universidade Aberta, 2024. doi: 10.34627/UAB.EAD.21
37. Schlemmer, E., Di Felice, M.: THE ECOLOGIES OF PRESENCE IN ONLIFE EDUCATION. ETD - Educação Temática Digital 25(prelo), pp. 1–20. (2023). doi: 10.20396/etd.v25i00.8667271