

PERSPECTIVE

Inclusive metaverse in media arts education: New innovative-methodological proposal for inclusive school

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ABSTRACT

The paper briefly describes the inclusive school places the greatest emphasis on inclusive innovation, which revolves around fostering knowledge of media arts. The main goal is to investigate and analyze the incorporation of the metaverse through the complementary subject of media arts for inclusive educational purposes. This proposal was allowed to incorporate the virtual and three-dimensional environment used for students and teachers, exploring and interacting with various digital worlds. The analysis of the results was carried out through the contents of the Venn diagram and additional creation, attending to criteria of investigative interest of inclusive metaverse to demonstrate and represent the new preliminary ideas through the educational development of media arts and virtual environments. There are debates about the analysis of inclusive metaverse as the most advanced engineering and artistic technology project, which allows you to incorporate the methodological proposal associated with the complementary subject of media arts together with the interactive tools, making visible in materiality more complex didactics of students of different levels of school education in general. In conclusion, the methodological proposal of media arts for the inclusive metaverse, each student, each teacher, or each educational system could transform the next generation of participation and motivation towards school, depending on the artistic and technological expression that students had learned by using educational gamification, that is, they are better prepared to face the art technology and challenges of the future, bringing with them a spirit of innovation and collaboration, marking a path in the world of digital art.

Keywords: media arts; art education; educational technology; inclusive school; student; teacher; metaverse engineering; theory

1. Introduction

Educational technology is rapidly changing the use of the concept of media arts. Currently, the educational system exists as a complementary subject to contextualize inclusive activity in the virtual classroom^[1]. It is possible to meet a new idea to incorporate the inclusive metaverse but avoid the generative and controversial art fraud of this system of non-human intelligence^[2,3]. After the COVID-19 pandemic, digital technologies expanded educational participation to generate a new meaning of metaverse towards inclusion, diversity, equity, accessibility, and security for virtual environments^[4,5].

The inclusive school places the greatest emphasis on inclusive innovation, which revolves around fostering knowledge of media arts. The only question we need to delve into is the inclusive metaverse: is it possible to create a new blockchain metaverse curriculum for the media arts? The blockchain metaverse for

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education^[6-8] analyzes creator-based digital technologies from socio-affective and socio-emotional studies in both the real and virtual worlds^[9,10]. Many educators are becoming interested in the use of interactive technology to motivate and reactivate school learning, depending on human-computer interaction, or other interactive tools of virtual reality (VR), augmented reality (AR), mixed reality (MR), and extended reality (XR).

Certain individuals or groups are also interested in interactive educational applications to benefit and encourage “friendly” learning. Not all physical and intellectual capacities are necessary, but there is a risk of learning failure or low student performance when using the inclusive metaverse in the virtual classroom. Exists an educational remodeling after the COVID-19 crisis on the metaverse plan of the teaching and learning process to generate a “new” interactive configuration of a virtual-physical classroom^[11].

It is possible to review the suggested questions: what is the inclusive metaverse for teachers and students? How does the media arts curriculum associate with the educational metaverse work? Why is it important to use the methodological design and the new educational approach of inclusive metaverse through art? What are the challenges and risks associated with educational technology? The main goal is to investigate and analyze the incorporation of the metaverse through the complementary subject of media arts for inclusive educational purposes. There is a finding with several researchers already experimenting with virtual technology alongside quite similar metaverses in different contexts and interactive tools (VR/AR/MR/XR) to provide engaging experiences with virtual representations of people, places, and objects^[8].

2. Literature review

The metaverse in education arose during the COVID-19 pandemic to demonstrate the meaning of online education, analyzing the new solutions of practice and learning and even teachers interacted with their challenges and setbacks, sharing a space, performing gestures and in a context, as well as machine learning techniques and real-time translation technologies as a three-dimensional space (or a virtual space)^[12].

Is it possible to include the didactic metaverse in educational technology? Knowing the research study theory for art education subject and technology education to integrate metaverse engineering system, both interactive tools software and artificial intelligence (AI) in the inclusive school. This preliminary study analyzes the different findings obtained to generate usability in education through the project, and by including this review, there is also the large gap in the research by providing a “guidebook” for the design and evaluation of the technological system in education, optimizing the resource management (didactics) at different levels of usability^[13]. However, some metaverse concepts of: i) multi-user, social and real-time dynamic interaction; ii) fusion between physical reality and digital virtuality, multisensory interactions and immersive environments; iii) VR and AR; and iv) avatars, teleportation and video games^[12]. Not all generations of the metaverse are provided with new educational spaces (remote or virtual laboratories) to generate new initiatives sponsored by software engineering companies, universities, or research centers, depending on the risks of personal or physical damage, of course, school failure, or poor learning.

3. Methodological proposal

This proposal was allowed to incorporate the virtual and three-dimensional environment used for students and teachers, exploring and interacting with various digital worlds. Logically, the transformation of virtual and interactive learning through the educational system of the metaverse, incorporating game-based learning experiences (gamification) and other activities inspired by games related to engineering, art, and historical subjects^[14,15]. In various instruments, didactic games were experimented with through gamification to

contribute to learning using educational technology engineering alongside the pedagogical strategy and student motivation to increase engagement in the virtual classroom^[16–18].

3.1. Didactic metaverse

The didactic metaverse consisted of the technological manifestation of the educational service to evolve virtuality in various instruments, such as interactive tools and gamification. Above all, the contents were expanded to improve educational practice through its teaching-learning processes, of course, to improve the most significant diversity of digital resources due to the advancement of more advanced and friendlier technological education^[19].

It was not easy from the pedagogical perspectives to contribute to big tech companies, of course, the metaverse big political responsibilities on the next generation (or future scenario) of social technology, i.e., the concept of educational relationship and didactic dimension from the metaverse were able to deepen the great change of interactive learning^[20]. Didactic, disciplinary, and interdisciplinary planning adopted the evolving teaching methods and the plurality of innovative pedagogies such as hybrid learning, computational thinking, experiential learning, teaching multiliteracies and the debate on gamification, and others, transforming the classroom by an ecosystem of interaction to integrate the proactive use of technologies towards the improvement of teaching effectiveness and the expected results of school learning^[4].

3.2. Didactic metaverse and AI

Although technology has been exerted for a long time by the influence in education on the interaction between the new frontiers of the metaverse and the impact of AI, they were particularly complex to promote digital inclusion^[4]. The metaverse has been recognized as the next generation of social connections, representing a virtual world where people can “live” under the rules defined by the creator^[21–23]. Impossible to supervise the social and psychological needs of the students, who proved challenging amidst the barriers encountered during the educational metaverse and machine learning incorporation^[24]. Various platforms for the didactic metaverse facilitated the school’s motivation and the learning topics about incorporating 3D technology, using professional projects or engineering areas, and it also established alternative learning for the complementary subject of media arts in the inclusive school.

The didactic potential of the use of digital content with AI, it proved challenging to analyze and proceed with the new trends with the materials (or thematic reviews) to obtain the great educative technological challenges related to the field of information and communication technologies (ICT) and digital literacy in different instruments of interactive tools, i.e., with experiences or new practices in art, or creative activity such as art gamification—on the use of VR/AR/MR/XR—in the education process, both digital applications and educational metaverse services.

4. Results

The metaverse can change society to mean and describe it as a three-dimensional space (or a virtual space) and interactive tools. Not all physics provide a different experience to users (students), but discover spatial computational creation, depending on the human interface and educational infrastructure^[12]. It is more complex to analyze the results to determine “the application of the didactic methodology based on metaverses”^[25] depending on the learning styles (physical, visual, and auditory). There is not the most notable evidence for the academic performance of inclusive student groups, both the experimental group and the control group to focus on interactive tools.

From new contexts of scenarios of immersive didactic proposals for the inclusive school with the complementary subject of media arts education, supporting with software engineering, transforming the necessary changes for the future of metaverse didactic work in the interactive artistic world, such as art gamification (or game-based learning) in the inclusive schools. However, it is possible to create a Venn diagram on metaverse engineering focused on media arts education in inclusive schools (**Figure 1**).

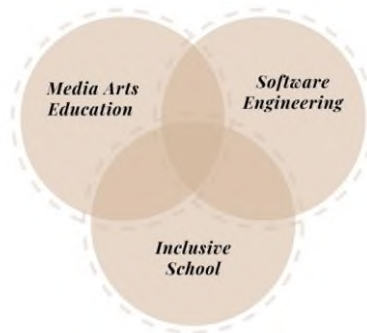


Figure 1. Inclusive metaverse's Venn diagram.

This diagram represents the new preliminary ideas for organizing the hierarchy through the development of virtual environments. Likewise, in the Venn diagram, it is possible to include three overlapping circles representing each set. The intersections between the circles would show the relationships between these specific concepts (**Table 1**).

Table 1. Inclusive metaverse's Venn diagram concepts.

Intersections	Concepts
Media arts education/software engineering	It is possible to represent the mutual collaboration between media arts educators and software engineering experts to develop new accessible tools and their creative educational applications for the influence of game-based learning technologies.
Software engineering/inclusive school	It is possible to analyze the implementation of software engineering to contribute to the development of the metaverse, i.e., it is the highest priority to promote inclusion for students and school accessibility of art gamification.
Media arts education/inclusive school	It is possible to illustrate different artistic-technological educational approaches through creative teaching and the art metaverse curriculum, motivating the art gamification and promoting school inclusion in space various classroom virtual environments.

Not all educational metaverse improved practices in media arts education, depending on metaverse application (software engineering) with high potential. For instance, radiation is hard to experience, so we might preemptively perceive it as dangerous, however, it's feasible to measure the positive educational effects when technical and scientific aspects of radioactivity are analyzed and experienced within the metaverse^[12].

On the other hand, there is the possibility of incorporating the new formula for engineering the inclusive metaverse into the overlay of the three sets (**Figure 2**). This Venn diagram is complex when it comes to integrating various educational and technological fields for the future of schooling and the involvement of the artistic community.

With the creation of the new engineering formula for the inclusive metaverse, the concept of technological projects is deepened, depending on the fundamental principles associated with the educational system. This encompasses the manipulation of the software system as well as the interaction between users (teachers and students) and the machine (interactive game or art gamification) to facilitate the teaching-learning process within the school environment as a whole (**Table 2**).

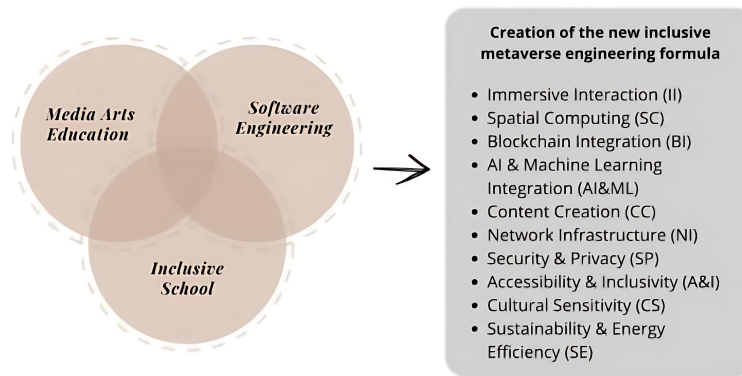


Figure 2. Inclusive metaverse's Venn diagram and additional creation.

Table 2. Additional of inclusive metaverse.

Formulas	Brief features
II	The degree to which users can engage and interact with the virtual environment. This involves factors like sensory inputs (visual, auditory, haptic), natural language processing, and user interfaces.
SC	The technology that enables digital content to be linked to specific locations in physical space.
BI	The incorporation of blockchain technology for security, authentication, ownership, and transactional capabilities within the metaverse.
AI & ML	The application of AI and machine learning algorithms for tasks like natural language processing, behavior prediction, and context-aware computing.
CC	The tools and technologies available for users to generate and contribute content to the metaverse, including 2D/3D modeling, animation, audio, and video production.
NI	The quality and capacity of the network connections that enable seamless communication and interaction within the metaverse.
SP	Measures and protocols are in place to ensure user data protection, prevent hacking, and maintain privacy in the metaverse environment.
A & I	The consideration and implementation of features to ensure that the metaverse is accessible to individuals with diverse skills and backgrounds.
CS	The awareness and accommodation of various cultural norms, values, and perspectives within the metaverse.
SE	The efforts to minimize environmental impact and energy consumption associated with operating the technology infrastructure of the metaverse.

5. Analysis of inclusive metaverse and media arts education

There are debates about the analysis of inclusive metaverse as the most advanced engineering and artistic technology project, which allows you to incorporate the methodological proposal associated with the complementary subject of media arts together with the interactive tools, making visible in materiality more complex didactics of students of different levels of school education in general.

The methodological proposal of media arts to exemplify the virtual activity of inclusive metaverse inside/outside the school (**Table 3**). It is important to introduce the school virtuality that allows students to interact and explore various digital worlds^[2,26]. Likewise, this methodological proposal aims to take advantage of the possibilities of using a metaverse educational system to provide a creative and friendly experience in the field of media arts^[27,28]. In addition, it seeks to encourage collaboration, experimentation, and artistic expression through advanced digital tools and interaction with other users in this shared virtual environment^[29,30].

Table 3. Methodological proposal of medial arts for the inclusive metaverse.

Proposals	Parameters
Immersion in the metaverse	<ul style="list-style-type: none"> • Introduction to the metaverse concept and its main characteristics of educational virtuality. • Creation of avatars and personalization of digital identities for students. • Guided exploration of the different worlds and settings available in the metaverse.
Digital art workshops in the metaverse	<ul style="list-style-type: none"> • Practical workshops focus on utilizing specific tools for artistic creation in the metaverse, including 3D design software, animation, and special effects. • Learning about interaction with objects and multimedia elements within the virtual environment. • Experimentation with different artistic techniques, such as digital painting, 3D sculptures, and the creation of virtual worlds.
Collaborative projects	<ul style="list-style-type: none"> • Students will work in groups to develop collaborative art projects in the metaverse. • Cooperation and exchange of ideas will be encouraged to create multimedia works that combine different artistic disciplines. • Projects can include interactive installations, visual storytelling, virtual art exhibits, and more.
Exhibition in the metaverse	<ul style="list-style-type: none"> • Organization of a virtual exhibition within the metaverse will showcase the projects created by the students. • Invite other users of the metaverse to visit and experience the exhibition. • Promotion of feedback and comments from the virtual community on the works presented.

Per the methodological proposal of media arts for the metaverse, it is crucial to leverage the benefit of social and collaborative skills in the virtual environment, enriching the new learning experience in the educational-technological field. By combining different workshops, practical studies, and collaborative projects of a virtual exhibition, it is possible to encourage creativity, interaction, and artistic expression for students in different shared digital spaces and new hybrid learning experiences. In addition, this methodology exists opportunities for students to connect with other creators and be motivated by art in the metaverse, enriching their educational and creative experience through fun learning games (gamification).

In other words, the different creative educational of media art projects in collaboration with a metaverse engineering specialist necessitates close cooperation and a mutual understanding of both disciplines. Next, it presents a guide to developing said project (**Table 4**) to know the metaverse engineering specialty.

Table 4. List of major aspects of the metaverse engineering specialty.

Aspects of the specialty	Description
Technologies and platforms	Mastery of the most advanced software engineering and development technologies for interactive tools (VR/AR/MR/XR), game engines, programming languages, and others.
Interaction and user experience (UX)	To design and offer the user experience (UX) both on the computer and in virtual systems through software in cyberspace or the educational virtual world.
Virtual scenarios and 3D graphics	The craft of 3D virtual environments encompasses landscapes, buildings, objects, animations, and more.
Collaboration and networks	Implementation of communication systems and networks to allow real-time interaction between multiple users.
IA	Use of AI to create realistic non-player characters and improve customization and adaptation of the metaverse.
Gamification and education	Integration of gamification elements in the metaverse design to improve motivation and learning.
Ethics and privacy	Addressing ethical and privacy concerns concerning the collection and utilization of personal data.

The metaverse engineering specialty is the most advanced set of computing skills and knowledge of virtual environments for challenging ethics and privacy^[31,32]. Metaverse engineers^[33–36] are responsible for virtual and collaborative environments creating, where user interaction and experience combine with AI applications^[37] to deliver a more meaningful experience. Integrating gamification and education elements into the metaverse design also drives user motivation and engagement, which can be especially beneficial in online

training and educational applications^[14,38,39]. Metaverse engineers must consider ethics and privacy when dealing with personal data, ensuring responsible and secure use of user information in the virtual environment. Generally, the metaverse engineering specialty is an exciting and ever-evolving discipline that plays a key role in creating advanced and meaningful virtual experiences.

6. Conclusions

With the new rise of the inclusive metaverse for the complementary subject of media arts in the general school, it is possible to obtain the support of interactive technology plus the benefit of teaching resources in the classroom metaverse. There is a new opportunity for school learning at any level—from preschool to school secondary, of course, other additional schools of special education, adult schools, and others—to design the existing model for the future of virtual teaching and interactive learning. Also, students, of course, media art teachers through the participation in inclusive metaverse activities to motivate a friendly environment of educational virtuality, as well as the promotion of creativity and innovation in the production of digital and multimedia works of art, depending on the development of technical skills in handling interactive tools, and specific software for artistic creation and expression in the virtual environment.

The emphasis on collaboration between metaverse engineering and educational teamwork has proven crucial for realizing joint art projects in the inclusive metaverse. Students have experienced the synergy of ideas and talents to significantly enrich their social and collaborative skills toward new creative frontiers in the virtual world. Next, the creative project corresponds to the methodology of media arts in collaboration with various specialists in metaverse engineering which requires close cooperation and mutual understanding of both disciplines. Here are the eight guidelines for demonstrating projects in development:

- Identification of the most common objectives: It is possible to establish the shared goals of the project. Both parties must understand media arts methodology to empower with metaverse technology and metaverse engineering. You can also benefit from the creativity and specific needs of media arts education.
- Defining the project scope: When defining the project scope, it is essential to have a clear idea of what is going to be addressed and what results are expected.
- Research and analysis: They play a vital role both for the metaverse engineering specialist and for the media arts education expert. They need to explore innovative trends in educational technologies and new interactive tools within their respective fields. Identifying best practices and approaches from both domains will enable them to combine efforts effectively and achieve the educational project objectives.
- Design and planning: When designing a detailed methodology for the project, consider the technical, creative, and pedagogical aspects, and of course, the educational implementation for the teaching of media arts, just as metaverse technologies will integrate into art activities and how UX will optimize.
- Creation of prototypes and tests: When developing the prototypes, or the new tests (pilot) to evaluate the methodology effectiveness in a controlled environment, that is, adjust and optimize the approach according to the results obtained.
- Continuous collaboration: Maintaining fluid communication and active collaboration throughout the project is achievable. Both parties must be willing to share ideas, challenge assumptions, and adapt as the project progresses.
- Evaluation and improvement: It is possible to evaluate the implemented project to collect feedback from both users and other art and technology specialists, using the feedback to improve and refine the methodology in future iterations.
- Dissemination and sharing of the expected results: Once the project is finished, share the expected results and learning obtained by students. This will enable others to benefit from the educational methodology of media arts, thereby contributing to the advancement of both disciplines.

This list of engineering metaverses has allowed collaboration between a metaverse engineering specialist and an art expert can generate innovative and enriching results for both areas. The combination of creativity and artistic expression with the advanced technology of the metaverse must have the potential to transform the learning experience into “friendly” and “sociable” for the future of the inclusive school.

In conclusion, the methodological proposal of media arts for the inclusive metaverse, each student, each teacher, or each educational system could transform the next generation of participation and motivation towards school, depending on the artistic and technological expression that students had learned by using educational gamification, that is, they are better prepared to face the art technology and challenges of the future, bringing with them a spirit of innovation and collaboration, marking a path in the world of digital art.

Conflict of interest

The author declares no conflict of interest.

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