METAVERSE AND EDUCATION: WHICH PEDAGOGICAL PERSPECTIVES FOR THE SCHOOL OF TOMORROW?

METAVERSO ED EDUCAZIONE: QUALI PROSPETTIVE PEDAGOGICHE PER LA SCUOLA DI DOMANI?

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Abstract

The large investments from big tech-companies and the vast attention that policy-makers around the globe are concentrating on the concept of metaverse are contributing in making it the "next big thing" in the course of the digital revolution that we will experience in the next decade. This concept, the metaverse, though, is not entirely new. A few decades ago, experiences such as *Second Life*, video games such as *World of Warcraft* or *Fortnite*, or certain social platforms strongly based on para-social interactions (e.g. Twitch) have already provided glimpses of what could be the future scenario of an internet enriched by the metaverse. It is thanks to cases like these that, in this exploratory phase, we can raise meaningful and important questions and reflections about the educational, training and didactic dimension of the metaverse. Which challenges and which opportunity can the metaverse bring to the world of education? What are the next kinds of digital divide that need to be addressed? How could the concept of educational relationship and educational presence change? The contribution intends to answer, with a pedagogical perspective, these, and other questions that the new immersive project proposed by Meta necessarily raises.

I grandi investimenti delle grandi aziende tecnologiche e la grande attenzione che i decisori politici di tutto il mondo stanno concentrando sul concetto di metaverso stanno contribuendo a renderlo la "prossima grande novità" nel corso della rivoluzione digitale che sperimenteremo nel prossimo decennio. Questo concetto, il metaverso, però, non è del tutto nuovo. Qualche decennio fa, esperienze come *Second Life*, videogiochi come *World of Warcraft* o *Fortnite*, o certe piattaforme social fortemente basate su interazioni para-sociali (es. *Twitch*) hanno già fornito scorci di quello che potrebbe essere lo scenario futuro di un internet arricchito dal metaverso. È grazie a casi come questi che, in questa fase esplorativa, possiamo sollevare interrogativi e riflessioni significative e importanti sulla dimensione educativa, formativa e didattica del metaverso. Quali sfide e quali opportunità può portare il metaverso al mondo dell'istruzione? Quali sono i prossimi tipi di divario digitale che devono essere affrontati? Come potrebbe cambiare il concetto di relazione educativa e di presenza educativa? Il contributo intende rispondere, in chiave pedagogica, a queste e ad altre domande che il nuovo progetto immersivo proposto da Meta necessariamente pone.

Keywords

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1. Introduction

The concept of the metaverse fits within a mythological historiography that most ICT technologies share: the rhetoric of radical novelty has accompanied many ideas related to the digital revolution since the famous 1984 Macintosh commercial directed by Ridley Scott (Friedman, 2005; Balbi, 2022).

For this reason, even Zuckerberg's global presentation of META on 28 October 2021 may have appeared as a turning point only to less attentive observers. In reality, the concept of the metaverse already has its own history, both in the literary (Stevenson, 1992) and technological sense. It refers to a reality existing beyond physical reality, within which we immerse ourselves. Perhaps the very image of immersion can help to understand in analogical terms what is meant: it is no longer a matter of superficially surfing the web, observing it from a screen, but of actively becoming part of it, with one's own body. Such a project may seem radically innovative, but it has been under consideration for some time for uses ranging from gaming to various forms of entertainment.

The 'platform-persistent-that-offers-services' concept is nothing new. Video Games such as *Ultima Online* (1997) and *World of Warcraft* (2004) and platforms such as *Second Life* (2003) have represented online universes - more or less persistent - that were able to offer their users much more than the mere gaming or chat experience: they were an access point to communities of people with whom they could freely interact and build relationships (Rueff, 2011). This means that the development logics of the metaverse must be understood within the roles assumed in the tech world by these early experiments. By analysing the evolution of these experimental metaverse platforms, it is possible to frame and summarise the theoretical characteristics of this environmental technology and bring out the questions and application possibilities in the educational field.

2. Metaverses, entertainment and the massification of the profits

Metaverse has changed shape over time to adapt to market needs; this evolution has mainly affected business models and the way in which constant user engagement is sought[2]. The Internet has moved a long way from the primordial vision of its first creators: from being a promised land of rights and sharing, it has become the domain of a few large companies, the elites of digital capitalism (Codeluppi, 2020), who provide services to retain users and make them use them more and more. In a word: monetise. This model makes the principle of quantitative extension its own. The digital entertainment industry - one of the first to have glimpsed this possibility - and the business models related to business service providers have espoused this logic with extreme zeal. Instead of tech products (software, DVDs, etc.), persistent platforms of services are made available, which incentivise their continuous and recurring use. One example is *Fortnite*: a famous video game developed by People Can Fly and published by Epic Games. The development history of *Fortnite* precisely highlights the importance of the choice of economic model in the success of the product. It began before 2011, the year in which it was presented by Epic as a regularly purchasable title and, at least according to the original plan, focused on offering a co-operative online experience in small teams of four players vs. hordes of AI-controlled enemies. In 2012, Epic Games is bought by the Chinese giant Tencent and the project becomes free-to-play[3].

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[2] Up to this point, the tools have remained more or less the same (computers, laptops, gaming consoles), but the features of an embodied metaverse have already been glimpsed in which devices such as haptic suits and controllers, VR/AR viewers will allow a more immersive interaction with digital environments (Tham et al., 2018).

[3] Free-to-play refers to games (often online and multyplayer) that are offered on the market for free. The game provides numerous items (cosmetic elements such as avatar skins, accessories, additional characters, special weapons) that can be purchased for real money via in-app purchases.

Upon its official release in 2017, *Fortnite* implements a new game mode, the 'Battle Royale', borrowed from another popular title, *Player Unknown's Battlegrounds (PUBG)*, which would be officially released a few months later: this game mode involves an open battle between one hundred players, connected online, in which only the last survivor wins the game. The interesting fact is that, with almost the same game experience, the success of *Fornite* over *PUBG* was dazzling. One of the main reasons for this dominance was precisely the economic model underlying the two titles: *PUBG* was sold at a cost of €30, *Fortnite* was free. Today, *Fortnite's* success is planetary (there is talk of more than nine billion dollars grossed in 2018 and more than 14 billion by 2020) and the game continues to mutate along with its audience: the introduction of seasons with seasonal, weekly and daily objectives; new skins, ballets and game modes; concerts by musicians (such as Ariana Grande); partnerships with companies for sponsorships (drinks, films, video games). Millions of players access a video game every day that is actually a metaverse, where they enter into relationships, display social status and negotiate their identity (Costa Pinto, et alii, 2015).

For at least a decade, a part of the video game entertainment industry has been moving towards forming a metaverse constellation: products such as *FIFA* (with its controversial 'FIFA Ultimate Team mode') or *Genshin Impact*, *League of Legends*, *Falling Guys*, *Destiny 2*, *Diablo Immortal* or the recent *Multiversus* are all free-to-play titles that are enjoying enormous success both in terms of popularity and in economic terms, and aim to be persistent platforms for increasingly loyal users.

Other types of entertainment industry have also embarked on similar paths. Service providers such as *Spotify* and *Netflix*, in fact, from simple sites to listen to music, watch films and TV series, have transformed themselves into platforms now perceived as indispensable by users, to the extent that they have shaken off the music industry from physical media or the home video industry on DVD or Blu-ray. They have become the point of reference for millions of people, who for the cost of a monthly subscription can access an infinity of songs, podcasts, films, TV series and many other exclusive contents. Then there is the example of *Amazon* and its *Prime* services: the annual subscription fee for the Prime service allows the user to obtain a series of benefits (zero shipping costs, exclusive offers, free eBooks, cloud for storing photos, access to *Prime Video* for TV series and films, free video games, access to *Twitch* with free subscriptions) with the intention of building a universe of all-inclusive services that, the more one uses them, the harder it is to give them up. By retaining more and more customers in order to sell them other side services (some tracks on *Prime Music* are only accessible with a plus subscription), it is then possible to collect an ever-increasing amount of data from users, which can be used to improve algorithms, to recommend products, propose films and TV series, and generate more and more revenue.

A 'race for services' that takes on the features of a 'race for loyalty'. A mode borrowed also from business service providers, if we consider that the concept of 'ecosystem' is increasingly associated with the tech world. Choosing *Apple* rather than *Microsoft*, *Android* or *Linux* means immersing oneself in a universe made up of hardware and software that only apparently - or to superficial use - perform the same operations; orienting technological instrumentation towards a universe has a very strong impact on the user experience - made up of more or less user-friendly interfaces -, on the availability of software - hence of the possibilities available to users - and on the way in which people interact and collaborate.

The reflection of this evolution of the fidelity system - which lies at the root of the development of metaverses - in the world of education and training, is still blurred, but the first elements are beginning to be glimpsed. The choice of an ecosystem, for example, is a diriment choice that will help - voluntarily or involuntarily - to direct students towards that universe. The risk is to present a tech universe as the only one possible or as the best, limiting a process of critical, conscious and ethical choice of available platforms.

Therefore, a future made of metaverses poses a question: will they really be compatible with each other, or will it be yet another challenge ground for a new 'race for loyalty'?

3. Metaverses

Summarising what has emerged from the historical reconstruction, we can try to give a provisional definition of the metaverse: it is designed as an extension of the real world (Kim, 2021) and operates on the principle that anything real can be experienced virtually, because the spatio-temporal experience is reconfigured on the basis of the technologies that project the XR, enabling users to create content, interact, and modify virtuality (Xi et al., 2022). This is a project that continues to grow thanks to the development of software, environments and hardware (Rauschnabel et al., 2018) but which in our opinion still remains partial.

Indeed, if we disregard these general aspects - for which the conceptual figure is the association of eXtended and Reality (XR) - a more in-depth definition is still under discussion. This is because 'metaverse' has at least two meanings. We can consider it in terms of a new meta-platform, understood as that digital space where experience becomes virtual, three-dimensional, immersive. In this case, one can speak of Metaverse. But one can also speak of a specific metaverse, different from others: one can imagine the metaverse of an open-source platform like *Decentraland*, or of a game like *Fortnite*. Just as there is the WWW and there are websites, there is the metaverse and the 'metaverse sites' (Floridi, 2022) - which is why at present it is more appropriate to speak of a constellation of meta-verses that are based on the technologies currently present.

Another aspect to consider is technological evolution: the metaverse is becoming a catalyst for the frontiers of Web 3.0, such as blockchain, cryptocurrency, NFT, etc. (Freeman et al., 2022): it would be the large container in which other digital innovations would find the most productive environment to flourish. In reality, there is a lack of an adequately advanced reference technology to specify the characteristics of the metaverse. In some ways, there has been a reversal from the normal evolution of technologies. Let's take the personal computer as an example: the invention of microprocessors led, in the 1970s, to the development of ever-smaller hardware, up to laptops. In this sense, the technological invention precedes the development of the digital device. In the case of the metaverse, the narrative of eXtended Reality, on the other hand, precedes the technological innovation that is supposed to make this new totally immersive Web experience possible. The metaverse is the narrative of a promise, as yet unfulfilled, or at least limited to those forms of engagement and loyalty that are based on marketing strategies rather than new technological inventions.

In any case, there are three characteristics that the extensive models of reality share and are therefore applicable to the metaverse concept: sharing, persistence and decentralisation. A 'shared' metaverse is a multi-user VR system, as *Second Life* was, in which people could interact with others using a new identity. The system must then provide a persistent and enduring world, allowing users to organise real life activities within that virtual context, such as working, owning, learning, interacting, having fun. Finally, decentralised technologies (blockchain) are needed to ensure that economic activities - each metaverse has its own cryptocurrency - can be conducted safely (Min - Cai, 2022). Furthermore, for XR to work, artificial intelligence (AI) is required, which allows the world of the metaverse to function by following the rules defined by the creator in the environmental ecosystem (Ortega-Rodríguez, 2022). Thus, an AR or VR system could be part of the metaverse to present virtual content, but the metaverse could contain additional elements.

In this operation, as can be understood, the level of uncertainty is still very high. However, one can observe how the XR phenomenon is the result of a process played out mainly on two coordinates. On the one hand, there is the quantitative dimension: the extension in this case plays as much on the plurality of services and possible platforms, addressed to profiles and users with different interests, as on the capitalisation that can be accomplished

precisely through the services offered by the XR of the metaverse. The equation involves the parallel growth of services offered to collect more subscribers, time spent on devices, and shared data. From this perspective, the metaverse represents the ideal space to open up business frontiers: new devices, services, the possibility of customising 'homes' and avatars. Research such as that of ReportLink (2022) indicates that the metaverse market could be worth $758.6 billion in 2025. Microsoft, Meta, Google and Samsung have long taken steps towards the parallel virtual universe (Gartner, 2022).

On the other hand, there is the dimension of extension as a qualitative phenomenon, which can recover that sense of virtuality as an opening of explorative, research and inclusion possibilities. On this second side lies the challenge for education.

4. Metaverses and pedagogical implications

In this still fluid context, there are several potential positive applications of the metaverse in pedagogy. One thinks of the implications in medical, nursing and health education, science and humanities education, technical and vocational education, and language learning. What is fascinating about the metaverse in a pedagogical sense is that it allows more opportunities to experience, explore, learn and teach in an alternative but sensory immersive world.

There are a number of potential applications in education and learning that rely on the environmental potential of meta-verses. They can become ecosystems in which to situate people in cognitive or practice environments that are otherwise dangerous in the real world, or that require involvement, practice time or materials that are expensive and unavailable. Second, recalling *Levy's The Virtual* (1995), metaverses could extend and transform one's vision, without making the virtual experience a falsehood or illusion, but making it one of the possible ways of being of the real. Understood in this way, metaverses would allow for the development of alternative thoughts, perceiving, experiencing and observing things from different perspectives and roles, enabling people to interact and collaborate with otherwise unreachable individuals. This theoretically allows for the exploration of potential thinking, involving users in complex, authentic and truly situated tasks in their contexts, taking on a transformative, utopian, unactual perspective (Bertin, 1997). Again, the meta-verses can offer, on the educational relationship front, fertile ground where third spaces can be built (Rossi, Rivoltella, 2019): places of encounter and interaction where the classroom experience can be enriched with materials, educational proposals, stimuli for peer relations and comparison with teachers and the community capable of prompting collaboration and critical re-elaboration of what has been tackled within the school walls.

In addition to these hypotheses, it is also necessary to point out possible risks that could occur with the dissemination of XR technologies underlying the metaverse. For the sake of brevity, we will mention the most significant ones here.

4.1 Metaverses: the challenges on the horizon

In the first instance, we see the possibility of new forms of digital divide arising. The concept of digital divide originated at the dawn of the development of the WWW to describe the difference in opportunities between those who have access to devices and those who do not (NTIA, 1999). Over time, it has taken on increasingly broader connotations (Bentivenga, 2009), moving away from simple "access or lack of access to devices" to embrace meanings linked to the concept of social inequality, especially in terms of possibilities and awareness of effective use of technologies (van Dijk, 2005, 2020), raising major concerns about the emergence of new forms of social inequality and the amplification of already existing ones (Wyatt et al., 2000).

The introduction and diffusion of the metaverse also in educational systems obliges the world of education to recognise and provide adequate responses to traditional and new forms of digital divide, just as happened with the recent COVID-19 pandemic that confronted the world of education with new stumbling blocks in this respect (Lai et al., 2021; Soriani, 2021). Specifically, in addition to the problem of possession of the new ICTs, and thus of the economic possibility of purchasing devices for accessing the future metaverse (viewers, haptic gloves, appropriate PC stations, etc.) for all members of the household, there is also a problem of a logistical nature: will all households really have sufficiently large home spaces to be able to guarantee a sufficiently large and safe area of movement and fully enjoy an XR environment of the metaverse?

A further problem arises: access devices to the metaverse will be increasingly mobile, wearable, personal and offer an increasingly exclusive enjoyment of content to the wearer. This will inevitably pose new challenges and new difficulties for parental mediation, making education for a responsible and welfare-conscious use of such devices increasingly relevant.

Secondly, the educational challenges of the metaverse call for attention to the issues of digital citizenship education, in particular the need to develop consumer awareness. In this regard, the Council of Europe has clearly expressed the relevance of this issue with a view to educating future citizens to full participation in a society where technologies and media are an indispensable element of reality (COE, 2019a; COE, 2019b). As mentioned above, the Internet, the world of video games, social networks and future meta-verses are environments where the fact of using the services offered means being consumers embedded in complex economic mechanisms. Being aware of these mechanisms, business implications and economic models - and of the effects these phenomena have on each one of us - is already a fundamental skill in order to develop the autonomy of digital citizens.

The role of teachers will be decisive, highlighting these elements, activating discussions, providing space for activities and reflections and making reasoned choices in the use of platforms and devices, motivated by real educational needs and as ethical as possible, also with a view to achieving sustainable development goals (UN, 2015).

4.2 Presence and relationship in the metaverses

It is also necessary to monitor the dynamics of interaction and relational processes that will develop within the meta-verses. Entering a given metaverse will mean inserting oneself in a specific context, with regulated grammars and forms of communication and exchange, and this will certainly have an impact on the concept of relationship and interhuman exchanges, as already widely verified in social contexts (Pasta, 2018).

Compared to the social media network, metaverses may have a different impact on interactions by virtue of the dynamics of presence that may develop. As several researches point out (Morris, 2020; Wiederhold, 2020), prolonged use of social platforms associated with web conferencing applications, generates physical and psychological discomfort, commonly referred to as Zoom Fatigue. This happens because in the brain, video-conferencing systems and social platforms are not decoded by a specific set of neurons - called 'GPS neurons' - that are activated when one occupies a position in the environment and that allow one to orient oneself in space and construct one's identity through the memory of the people and events that took place in the different places attended (Moser et al., 2015). It has been observed that when we experience several spaces at once (we are in a room at home and in a video conference for a meeting), the location that the brain 'remembers' is the space in which we can move, not the space we are viewing on the PC or smartphone (Li, 2020). For the brain, there remains an unbridgeable gap between the experiences we have within social networks - non-places characterised by an eternal digital present - and autobiographical memory (Riva et al., 2021).

With XR, however, GPS neurons are activated: this can make users present in metaverses. By trying to predict the sensory consequences of users' movements, by constructing the same scene (visible in the helmet) and the same sensations (generated by the sensors) that they would experience in the real world, the technologies behind the metaverses could over time generate a sense of presence in the virtual environment for immersive users (Riva, 2018).

This potential - yet to be constructed - makes the metaverse a significantly different technology from social media: as Riva and Wiederhold (2022) state with respect to the persuasive power of social platforms, capable of influencing people's attitudes and behaviours, the metaverse could become a transformative technology, capable of modifying what people think reality is through the management that XR could take over several key cognitive mechanisms, such as the experience of being in a place and in a body, the processes of brain-brain atonement and synchrony, and the ability to experience and induce emotions. In short, interhuman presence and relationships would change dramatically.

If the criterion and logic for the development of metaverses is only the quantitative-economic one, the transformative power of such technology will remain deregulated and without governance. Without holding firmly to a 'human', integrated and multidisciplinary criterion that combines knowledge of technological aspects with that of the processes and contexts in which metaverses will be used, the challenge of making this new technology a *magis* for humanity will be lost.

5. Conclusions

Despite the fact that it is still far from being truly implemented, the metaverse represents an imaginary loaded with concerns and expectations for our society in the first place, but especially for the world of education.

In this contribution we have tried to show that the business models underlying this concept are far from being a novelty, and indeed we are beginning to see clearly the outlines of a scenario in which the sale of cloud services, push monetisation and the race for user loyalty will be the basis on which increasingly competing metaverses will be built.

All this poses to the world of the school, of a school that wants to enter the metaverse, a series of reflections that should not be underestimated: new and old forms of digital divide will emerge, new challenges and new frontiers will be posed from the point of view of educational poverty, as well as new forms of educational interaction and relationships will inevitably be defined.

In conclusion, our criticism concerns the exclusively quantitative meaning of 'extension' assumed by the XR of metaverses. The gap to be filled lies in the lack of focus on the second meaning that the concept of extension can take. XR offers an opportunity to rethink the qualitative dimension of digital interactions and action patterns, and may allow us to replace, improve or implement certain activities. Extending in this sense could become synonymous with that virtualising theorised by Levy (1995) for Web 1.0, i.e. making other itineraries possible, and thus offering individual and collective models for social growth. Herein lies the opportunity, in a utopian-pedagogical sense, to offer directions for research and exploration at this stage, in which the itineraries of the metaverse are still to be developed.

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