Media Ecology, Transhumanism and the Metaverse: Challenges for Media and Technological Literacy

Ecologia da mídia, transumanismo e metaverso: desafios para a alfabetização midiática e tecnológica

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A B S T R A C T

This study aimed to explore Media Ecology (MS) and its impact on culture and education in the digital age. To analyze key concepts, examine their use in different contexts, identify tools for media and technological literacy and assess their effect on contemporary society. As a methodology, a systematic literature review was carried out to collect relevant information about MS and related aspects, identifying influential authors and essential tools for media and technological literacy. In addition, comparative analyses were carried out to understand the role of MS in different contexts and its impact on today's society. As Development and Results: Several tables were presented that summarize the main concepts of MS, its use, tools and the impact of MS on society. These tables provide an overview of the topics covered, highlighting MS related authors and papers. As final considerations, this work highlighted the importance of media and technological literacy in today's society, in which SM plays a fundamental role in perception, understanding and cultural values. The need to understand the negative and positive effects of MS, its contribution to overcoming media and cultural "numbness", was emphasized. This study provided a solid foundation for understanding MS and its relevance to contemporary education and culture. It is hoped that this analysis will inspire further research and debate in this ever-evolving field.

RESUMO

Este estudo teve como objetivo explorar a Ecologia da Mídia (EM) e seu impacto na cultura e na educação na era digital. Analisar conceitos-chave, examinar a sua utilização em diferentes contextos, identificar ferramentas para a alfabetização midiática e tecnológica e avaliar o seu efeito na sociedade contemporânea. Como metodologia, foi realizada uma revisão bibliográfica sistemática para coletar informações relevantes sobre a EM e aspectos relacionados, identificando autores influentes e ferramentas essenciais para a alfabetização midiática e tecnológica. Além disso, foram realizadas análises comparativas para compreender o papel das EM em diferentes contextos e o seu impacto na sociedade atual. Como Desenvolvimento e Resultados: foram apresentadas diversas tabelas que resumem os principais conceitos da EM, sua utilização, ferramentas e o impacto da EM na sociedade. Essas tabelas fornecem uma visão geral dos temas abordados, destacando autores e trabalhos relacionados à EM. Como considerações finais, este trabalho destacou a importância da alfabetização midiática e tecnológica na sociedade atual, na qual o SM desempenha um papel fundamental na percepção, na compreensão e nos valores culturais. Foi enfatizada a necessidade de compreender os efeitos negativos e positivos da EM, o seu contributo para a superação do "entorpecimento" midiático e cultural. Este estudo forneceu uma base sólida para a compreensão das EM e a sua relevância para a educação e cultura contemporâneas. Espera-se que esta análise inspire mais pesquisas e debates neste campo em constante evolução.

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Introduction

Media Ecology (MS) is presented as a multifaceted discipline that addresses the impact of media and technology on human culture and societies throughout history. The field of study has been promoted by prominent figures such as McLuhan (1996) and Postman (1991), who recognize that the media are not simply channels for the transmission of information, but generators of environments that directly or indirectly shape our perception, understanding, emotions and values.

The justification for this study is based on the growing interaction between technology and society, as well as the influence of media and technology on culture, education and even human identity, as Bukinghan (2007) argues. In the age of information and communication, this situation is undeniable, which is why we seek to critically address and examine the impact of MS in contexts such as emerging technology, (Blanksten, 1966), transhumanism and the metaverse, what has to say about Campitiello (2023). This is the construction of a digital world that aims to follow the patterns of a real one, an immersive universe that requires coupling the changing dynamics, as well as the social and economic constraints of certain demographics. Obviously, once these dynamics are understood, and actively participated, innovation and digital inclusion will be allowed for society, which in some places in the 21st century, do not have access to technology, either due to lack of resources to acquire them or simply because there are no basic services, such as electricity. Digital inclusion is required, so that users can take advantage of its advantages and be more competitive in this changing world, which requires new approaches to solving problems every day.

The objectives of this manuscript are to explore and analyze key concepts in MS, its evolution, intensification and interrelation with humanity in a scenario of the fourth and fifth industrial revolutions, as well as to evaluate how this interaction establishes crucial ideas related to transhumanism, and that it can bring with it dangers derived from the misuse of nanotechnology and biotechnology, (Gayozzo , 2021) in turn, the metaverse, media and technological literacy. On the other hand, Jenkins et al., 2013 argue that all information should be disseminated in order to broaden its dissemibility and achieve understanding of its content.

When analysing the current state of affairs, and as Herrero (2018) argues, the contemporary relevance of MS is evidenced by the unprecedented speed of technological innovation. We live in an era where Artificial Intelligence (AI) (Lledó Llagüe et al., 2021), Virtual Reality (VR) (Martínez Presas, 2022), Augmented Reality (AR) (Marín Díaz, 2017), Extended Reality (RE) (Campitiello, 2023) and massive data processing are radically transforming the way we relate to the world.

In addition, technologies are shaping a path, which usually intersects with transhumanist approaches and the invention of digital metaverses, where the real and virtual parts converge in hyperconnected experiences; at the same time, media and technology literacy

emerges as a critical resource for: Navigating emerging environments, understanding their implications, and making informed decisions (Rivadeneira et al., 2023).

It is important to note that McLuhan (1996) is the seminal figure in MS, stating that "the medium is the message", arguing that the medium, in itself, influences society more than the content, itself, transmitted. This point of view becomes even more relevant in the current context, where technology not only shapes perception, but redefines the very nature of the human. Consequently, it is debated whether transhumanism, with its vision of human enhancement fused with technology, **Is it a reflection of the influence of the technological medium on culture and society?**, or ethics are simply left aside or not, according to Gómez Quintero (2021). By the same token, as human development technologies such as brain implants and genetic research advance, fundamental ethical and social questions are raised about the development of human development, **Who are we as human beings and how do we define humanity?**

For these reasons, the metaverse is presented as a new digital horizon in which individuals can interact, work and live in unimaginable ways, in turn, the creation of these virtual worlds raises questions about identity, digital ownership, privacy and autonomy in a space that transcends physical boundaries. As we explore these digital frontiers, it is crucial to consider how these environments will affect education, communication, and culture (Francalanci, 2022).

The history of technology and the media shows that every technological advance brings with it negative and positive effects on the socio-cultural structure of a social conglomerate; Such implications can often outweigh the apparent benefits of a particular technology. However, Narváez (2021) argues that media and technological literacy become essential in people's daily lives, so skills are required for their application. Therefore, these skills not only imply the competent use of technological tools, but also the ability to critically evaluate the effect it has on the environment in which it takes place, to avoid communication errors as much as possible and to make the most of the opportunities of the media to build a better informed society and light the way towards the effective understanding of emerging opportunities. as an appropriate form of education and digital inclusion.

Development

Material and Methods

To thoroughly understand the impact of Media Ecology (MS) as a transhumanist imaginary within the metaverse, as well as the need for adequate media and technological literacy; an interdisciplinary research approach was carried out (Adaval, 1971) it included a literature review through the critical analysis of significant sources that provided an enriching view of the interrelationship between media ecology, transhumanism, the metaverse as well as media and technological literacy. This methodology was chosen because it has a distinctive

approach, where key observations and important results were highlighted that provided clear insights into the current and future dynamics of these topics, and allowed for the integration of multiple academic perspectives due to the emerging constitution and interconnectedness for the understanding of the topics addressed.

Sampling and Sampling Strategies

Since this study focused on literature review and critical analysis of sources, no sampling techniques were applied and no specific sample was used. Instead, relevant sources addressing the topics of interest were selected and critically evaluated.

Type of Statistical Analysis

Given the qualitative approach of this study, no statistical analysis techniques were applied. Instead, an interpretive approach was used to understand and synthesize the information collected in a manner consistent with the research objectives.

Possible Limitations

A potential limitation of this interdisciplinary approach is the dependence on the quality and availability of the literature and sources selected. In addition, by focusing on the literature review, and derived from that, this work does not include original empirical data, only the corresponding reflections. Conclusions and findings are based on the interpretation and synthesis of existing information. Future research could consider mixed approaches that incorporate quantitative and qualitative methods to gain a fuller understanding of these complex issues.

Literature Review

An extensive review of national and international literature was carried out in key fields such as: Media Ecology, Transhumanism, Metaverse and Media and Technological Literacy. The literature search was carried out in academic databases, scientific journals, books and specialized publications, from which the most important and current ones were carefully selected in the contextualization and support of the study for its adequate understanding.

Critical Analysis of Sources

A critical analysis of the selected sources was carried out to identify trends, key concepts and relationships between the themes; This process involved the extraction of important data, as well as the correct evaluation of the quality of the information. Special attention was paid to the opinions and arguments of experts in these fields, including Marshal McLuhan and Neil Postman in the field of Media Ecology.

Definitions of Principal Constructs

In the context of this study, it is essential to clearly understand the key concepts that underpin the research, for this reason definitions of the main meanings that guide this work are presented, including the authors who have contributed significantly to each aspect indicated, so some clarifications about the topics addressed are described below:

1. **Media Ecology (MS):** It is a metadiscipline that, from the point of view of Silva et al. (2019), examine the impact of tools, media, and technologies on human culture and societies throughout history (Islas, 2015). MS focuses on how media creates environments that affect people's perception, understanding, feelings, and values, and how our interrelationship with media can facilitate or hinder our cognitive survival. At the same time, the MS is concerned with media and technological literacy, promoting critical understanding of the media and its proper application, in this line influential authors include McLuhan and Postman.

2. **Transhumanism:** It is a school of thought that advocates the improvement and evolution of humanity through science and technology; it seeks to overcome traditional human limitations, such as aging, physical and mental weaknesses, by merging with technology and its advances in health and other aspects of society. It proposes ethical and philosophical situations regarding the transformation of human identity and values in an increasingly technological world, but also with gender tendencies that in many cases confuse the form of human behavior. Some of the notable authors in this field include Mark (2018) and Hottois (2016).

3. **Metaverse:** It is a concept alluded to a three-dimensional and constantly evolving digital space, a scenario where people can interact, socialize, work and play in virtual environments; it is an extension of virtual reality and augmented reality, considered as a new paradigm; it raises questions about the construction of digital identities, the economy, and participation in virtual communities. Although the concept of the metaverse has been popularized by science fiction and popular culture, authors such as Haar (2019) and Greenbaum, (2022) have explored its implications.

4. **Media and Technology Literacy:** It refers to the ability to understand, critically evaluate, and effectively use media and technology. It involves the ability to analyze information, discern reliable sources of information, and use technological tools ethically and productively. Media and technological literacy is essential in a world where information and technology play a central role in daily life and decision-making, which

sometimes leads to disinformation due to lack of knowledge about their use. Authors such as Livingstone and Sefton-Green (2017).

The definitions described above provide a solid basis for understanding the key concepts explored in this study and recognize the influence of various authors in the formulation and development of concepts, allowing students to foster socio-emotional and critical thinking skills, given the evolving environment of technologies. Therefore, there is a need and importance to promote adequate and successful educational policies, so that teachers and students are prepared for a fast-paced future, where misinformation prevails. It is necessary to maintain constant training for both teachers and students, because from one year, even from one day to the next, knowledge becomes obsolete.

Presentation of Results

Although no statistical analysis techniques were applied due to the qualitative nature of this research, the results are presented in a logical manner consistent with the objectives of the study. The most relevant observations are highlighted through a narrative that links the key themes. The figures and tables present some related aspects to compare, evaluate and propose ideas around the Ecology of MS Media.

The following tables express the main ideas derived from the literature review and the analysis carried out to understand the importance of how educommunication should address the challenges to achieve true media and technological literacy without leaving anyone behind, thus responding to one of the objectives of the 2030 plan established by the United Nations (UN) (2015).

Table 1:
Ethical Challenges of Transhumanism.

Ethical Challenges	*Implications*
Social and human improvement	Questioning equality and diversity
Data privacy	Risks of surveillance and loss of privacy
Social responsibility	Moral dilemmas in the application of technologies

Note: Own elaboration.

Table 1 shows the Ethical Challenges of Transhumanism, where it is determined that transhumanism, by promoting human betterment through technology, poses significant ethical challenges, such as the redefinition of humanity and the search for social, cultural, and economic democracy that can lead to debates about equality, privacy, and moral responsibility.

Table 2:
Transformative Potential of the Metaverse.

Areas of Transformation	Potential Impact
Digital Identity	Creating and managing virtual identities
Virtual Experiences	Cambios en la forma de trabajar y socializar
Digital Economy	New business models and the virtual market

Note: Own elaboration.

Table 2 shows the Transformative Potential of the Metaverse, identifying that the metaverse, as a new digital horizon, has the potential to transform the way we live, work, and relate to each other. In other words, as individuals construct digital identities and participate in virtual experiences, a new dimension in Media Ecology arises.

Table 3:
Need for Media and Technology Literacy.

Skills Needed	Importance
Critical Evaluation	Discerning reliable information from misinformation
Technological Adaptation	Ability to learn and use new technologies
Ethical Awareness	Understanding the ethical implications of technology

Note: Own elaboration.

Table 3 shows the Need for Media and Technological Literacy. Given the impact and complexity of these issues, the urgent need for media and technological literacy is highlighted (Garro-Rojas, 2019). Therefore, society requires skills to navigate a saturated media environment, as Jenkins et al. (2009) argue, which derives from the need to understand the ethical debates of transhumanism and adapt to the changes introduced by the metaverse, which also concerns inequalities and therefore a digital divide for peoples and communities with limited economic resources. According to Maya Álvarez (2008), there are three types of digital divide: Gender, territorial and generational.

Table 4:
Main Ideas and/or Relevant Concepts in Media Ecology.

Main Idea/Concept	Relevant Authors	Featured Work	Year of Publication
El medio es el mensaje	Marshall (McLuhan M. , 1968)	Understanding Media: The Extensions of Man	1968
Medios como entornos	Neil (Postman N. , 1985)	Amusing Ourselves to Death	1985
Impacto de los medios	Walter J. (Ong, 2002), Joshua (Meyrowitz, 1993), Elizabeth L. (Eisenstein, 1993)	"Orality and Literacy", "No Sense of Place", "The Printing Revolution in Early Modern Europe"	2002, 1993[1], 1993
Globalización mediática	Camille (Sutter, 2009), Manuel (Castells, 2009)	"Armand Mattelart, Histoire de l'utopie planétaire. De la cité prophétique à la société globale" "The Rise of the Network Society"	2009, 2009
Alfabetización mediática	(Livingstone y Sefton-Green, 2017), Renee (Hobbs, 2017), (Rosbach, 2011)	"The Class: Living and Learning in the Digital Age", Exploring the Roots of Digital and Media Literacy through Personal Narrative", "Translation and Convergence Culture: German Renderings of Uncle Tom's Cabin"	2017, 2017, 2011
Convergencia mediática	(Jenkins, Henry; Plasencia, Adolfo, 2017)	"Convergence Culture: Where Old and New Media Collide"	2017

Note: Own elaboration.

Table 4 shows the Main Ideas and/or Relevant Concepts in Media Ecology. It provides an overview of key concepts and important authors in the field of MS associated with these concepts. Each section addressed in the table contributes to our understanding of how media and technology impact culture and society. At the same time, these concepts are substantial for the discussion in this paper, helping to contextualize and enrich the analysis.

A very famous phrase **"The medium is the message"**, proposed by McLuhan (1996) in his work "Understanding Media: The Extensions of Man", argued that the medium through which a message is communicated, significantly affects the way of perceiving and understanding that message. This view has become a mainstay in the study of media and culture over the years.

We also have Postman (1991), who explored this notion of **Media as Environment**, in his work "Amusing Ourselves to Death" in 1985. This author suggests that the media not only transmit information, they also create a cultural environment that influences people's perception and thinking. In this perspective, it also highlights how the media shape our understanding of the world.

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[1]The work was originally published in English as: "No Sense of Place. The Impact of Electronic Media on Social Behavior", New York, Oxford University Press, 1985. It was translated into Italian in 1993 as "Oltre il senso del luogo. L'impatto dei media elettronici sul comportamento sociale".

Media Impact. Authors such as Ong (2002), Meyrowitz (1993), Livingstone & Sefton-Green, (2017) and Eisenstein (1993) in works "Orality and Literacy", "No Sense of Place", "The Class: Living and Learning in the Digital Age," and "Exploring the Roots of Digital and Media Literacy through Personal Narrative" have contributed to the understanding of the impact of media as a social and cultural influence throughout history.

On the other hand, Sutter (2009) and Castells, (2009) in their works: "Armand Mattelart, Histoire de l'utopie planétaire. De la cité prophétique à la société globale" and "The Rise of the Network Society", discuss how **Media Globalization** through ICTs has contributed to the formation of an interconnected global society.

Sonia Livingstone, Renee Hobbs and Annika Rosbach, are prominent figures in the field of **Media Literacy**, in works such as "Media Literacy in the Information Age" "Translation and Convergence Culture: German Renderings of Uncle Tom's Cabin" highlight the importance of educating people to understand and use media critically in the digital age.

Another relevant author in this scaffolding is Henry Jenkins, who has extensively researched **Media Convergence** in his work "Convergence Culture: Where Old and New Media Collide". This idea refers to the intersection of different forms of media and how this has transformed the production and reception of media content.

Table 5:
Comparison Table: Use of Media Ecology (MS) in Different Contexts.

Comparison Aspect	*Historical Context*	*Today's Society*	*Contribution to Overcoming "Numbness"*
Effects of MS	Throughout history, MS has shaped societies' perceptions, understandings, and cultural values. It has influenced the formation of public opinion and the construction of social identities.	In contemporary society, MS has peaked with the digitization and globalization of media. It has become an influential factor in the dissemination of information, the formation of online communities, and the creation of new forms of cultural expression.	MS can help overcome media "numbness" by fostering critical literacy and awareness of how media influences perception. Promotes understanding of the negative and positive effects of media in today's society.
Cultural Impact	Throughout history, MS has shaped the culture and identity of societies, promoting shared values and cultural norms. It has also generated cultural conflicts and challenges in cultural diversity.	In today's society, MS has led to a cultural globalization, where cultural influences spread globally through the media. This has led to cultural interconnectedness, but also challenges in preserving local cultural identities.	MS can help address cultural "numbness" by enabling understanding of how media impacts cultural diversity and how they can preserve cultural identities in a globalized media world.

Note: Own elaboration.

Table 5 shows the *Use of Media Ecology (MS) in Different Contexts*. Identifying that MS has evolved throughout history and plays a fundamental role in today's society. Their understanding and application can contribute to addressing media and cultural "numbness"

by fostering critical literacy and awareness of its impact on society. This table examines the use of Media Ecology (MS) in different historical contexts and in today's society, followed by an analysis of each aspect mentioned:

Effects of MS

✓ Historical Context: Throughout history, MS has had a major impact on societies' perception, understanding, and cultural values. Therefore, it influences people in the way they perceive the world and communicate with each other. In the past, the media such as the printing press and radio had transformative shares in society by facilitating the dissemination of information and the formation of public opinions, due to their vocation and ethical seriousness. Nowadays there is more disinformation due to the lack of professional ethics of the media.

✓ Current Society: MS has peaked with the digitalization and globalization of media; The proliferation of social media on digital platforms has changed the way people consume information. MS plays a crucial role in the dissemination of news, so ethical aspects are required so as not to cause disinformation.

✓ Contribution to Overcoming "Numbness": MS can contribute to overcoming media "numbness" by fostering critical literacy and awareness of how media influences perception, citizenship and schools should be pillars to motivate understanding of the negative and positive effects of media in today's society, people can be more informed and critical media consumers as there is adequate digital literacy.

Cultural Impact

✓ Historical Context: Throughout history, MS has played a critical role in shaping the culture and identity of societies. It has promoted shared values, cultural norms and contributed to the construction of cultural identities. However, it has led to cultural conflicts and challenges related to cultural and even gender diversity.

✓ Today's Society: In today's society, MS has led to cultural globalization, where cultural influences are disseminated globally through the media, which has resulted in a cultural interconnection. This globalization has also posed challenges in preserving local cultural identities and cultural diversity.

✓ Contribution to Overcoming "Numbness": MS can contribute to addressing cultural "numbness" by enabling an understanding of how media impacts cultural diversity. It can help explore how cultural identities can be preserved in a globalized media world. Promoting cultural awareness and appreciation of cultural diversity can be a way to mitigate the negative effects of cultural "numbness", for this the different levels of education must work on it, then public policies are also required that improve education and avoid the digital divide and improve the impact of employability, economy and society.

Table 6.
Tools for Media and Technology Literacy.

Tool	Description	Importance in Media and Technology Literacy
Social Media Platforms	Platforms such as Facebook, Twitter, and Instagram allow for online interaction and the dissemination of information.	These platforms are important for media literacy because they are a common means of consuming news and digital content. Users must learn to assess the veracity of information and understand how it spreads on social media.
Search Engines	Google, Bing and other search engines help find information online.	The ability to search for information effectively is essential for technology literacy. Users should know how to use search engines and evaluate the quality of the results.
Fact-Checking Tools	Websites such as Snopes[2] and FactCheck.org[3] verify the veracity of news and information.	These tools are crucial for media literacy, as they help identify false or misleading information. Users can verify data before creating or sharing content.
Online Learning Platforms	Platforms like Coursera and edX offer online courses on a variety of topics.	These platforms are valuable for tech literacy, as they allow people to gain digital skills and specialized knowledge online.
Browser Extensions	Extensions such as NewsGuard[4] provide trustworthiness ratings for news websites.	Browser extensions can help users assess the credibility of online news sources, which is essential for media literacy.

Note: Own elaboration.

This table 6 presents a selection of essential tools in the context of media and technological literacy. Each tool plays an important role in people's ability to effectively interact with digital media and online information. They are key resources to empower people in the digital age, for this it is necessary to promote the ability to discern information, acquire educational technological skills and be able to participate in an informed way in the digital society, according to Ugalde (2021).

Key points are highlighted below:

✓ Social Media Platforms: Fundamental to media literacy due to their role in the dissemination of information and news. Users must learn how to evaluate the veracity of information on social networks.

✓ Search Engines: The ability to search for information online effectively is essential for technological literacy. Users should know how to use search engines and evaluate the quality of the results.

✓ Fact-Checking Tools: They help identify false or misleading information, which is crucial for media literacy and the promotion of accountability in the dissemination of information.

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[2]Snopes is a fact-checking site, validating or invalidating internet rumors, urban legends or message chains, it is very useful to avoid media misinformation. You can search and validate at https://www.snopes.com/

[3]FactCheck.org, A U.S. NGO, closed to avoid confusion and level of deception, in 2019, allowed Spanish speakers living in the U.S. to learn about the Covid-19 situation.

[4] NewsGuard Inc., created in 2018, it offers a web, mobile and PC browser extension, created to flag with a red flag, any article and/or blogs with possible fake news.

✓ <u>Online Learning Platforms:</u> They allow you to acquire digital skills and specialized knowledge online, which contributes to technological literacy and continuous learning.

✓ <u>Browser Extensions:</u> They help users assess the credibility of online news sources, which is essential for media literacy and identifying trusted sources.

Table 7

Analysis of Digital Tools and Media.

Tool / Digital Media	Main Driving Focus	Application Approach	Ambitious Question	Nature of the Intervention	Time Management
Social Media	Digital communication and online participation.	Communication and network building.	How does social media influence public opinion?	Digital interaction and online engagement.	Requires management to avoid overexposure.
Search Engines	Searching for and accessing information.	Searching for and accessing information online.	How do search engines affect the perception of information?	Access to information and online search.	It requires discernment in the choice of outcomes.
Fact-Checking Tools	Verification of the veracity of information.	Verification of information and confirmation of data.	How can fact-checking platforms combat misinformation?	Online fact and fact check.	Requires constant updating and collaboration.
Online Learning Platforms	Online Education and Skills Development.	Online education and training.	How can online learning platforms bridge the education gap?	Online education and training.	Requires adaptation and accessibility for all.
Browser Extensions	Assessing the credibility of websites and news.	Online credibility assessment.	How can browser extensions strengthen media literacy?	Online credibility assessment.	Requires installation and user awareness.

Note: Own elaboration.

Table 7 presents an *Analysis of Digital Tools and Media.* Showing how these tools can have positive effects, such as facilitating global collaboration and access to information, but also negative effects, such as the spread of disinformation and unchecked and logical digital addiction (Morejón Llamas, 2023).

The ambitious questions raised reflect the importance of understanding whether the correct application of these tools can contribute positively to the educational cultural aspect

and the educational social construct. It also highlights the need for proper time management and critical evaluation in an ever-evolving digital environment.

Table 8.
Impact of Media Ecology (MS).

Comparison Aspect	Definition	Main Authors	Effects on Society	Importance of Media and Technology Literacy
Media Ecology (MS)	Explores the impact of tools, media, and technologies on culture and societies throughout history.	Marshall McLuhan, Neil Postman.	Influencing perception, understanding, values, and survival.	Makes it easy to understand and apply media effectively.
Positive Effects of MS	Facilitates global collaboration, formation of virtual communities and access to information.	Marshall McLuhan, Neil Postman.	Encourages active participation and online learning.	Promotes critical skills and personal development.
Negative Effects of MS	Spread of disinformation, polarization, and digital addiction.	Marshall McLuhan, Neil Postman.	It can lead to overexposure and wasted time.	Requires time management and critical evaluation.
Importance of Media and Technology Literacy	Enables effective understanding and use of media and platforms.	Marshall McLuhan, Neil Postman.	Helps avoid media "numbness".	Essential for active participation in the digital age.

Note: Own elaboration.

It highlights the relevance of Media Ecology (MS) in culture and society throughout history, its impacts on perception, understanding, values and survival as a metadiscipline. It presents Marshall McLuhan and Neil Postman as the main authors who have contributed to this discipline.

The effects, positive and negative, resulting from our interaction with the media are highlighted. It highlights the importance of media and technology literacy as a key tool for understanding and using media and platforms effectively. It should be noted that the negative effects generate gaps in teacher education that contribute to the unfortunate reality that many education systems do not adequately prepare and support teachers, resulting in a teacher workforce that lacks adequate content and knowledge to improve student achievement.

The key points are summarized below:

✓ Media Ecology (MS): It is defined as the exploration of the impact of tools, media, and technologies on culture and societies throughout history. McLuhan and Postman are the main authors who have contributed to this discipline.

✓ Positive Effects of MS: It facilitates global collaboration, the formation of virtual communities, and access to information. This encourages active participation and online

learning, highlighting the importance of developing critical skills and personal growth in the digital society.

✓ Negative Effects of MS: Despite its benefits, MS has also spread misinformation, polarization, and digital addiction. This can lead to overexposure and wasted time. Therefore, time management and critical evaluation are essential to address these negative effects.

✓ Importance of Media and Technology Literacy: Media and technology literacy is essential to understanding and using media and platforms effectively. In addition, it helps to avoid media "numbness", allowing people to actively participate in the digital age.

Relevant Observations:

1. Impact of Technology on Perception: The influence of media and technology on human perception is evidenced in studies demonstrating how constant exposure to digital screens can affect attention and cognition. This raises important questions about how people process information in a crowded media environment and how it can significantly impact improving their lives.

2. Transhumanism and Redefining Humanity: Transhumanism, which seeks the enhancement and extension of human capabilities through technology, raises fundamental questions about the nature of humanity. There is an active debate on the ethics of technologies and their impact on individual identity and autonomy.

3. Metaverse and Reconfiguring Reality: The metaverse, as an extension of virtual reality, promises a radical reconfiguration of the way people interact and relate digitally. In this sense, Campitiello (2023) argues that the metaverse brings with it an anthropological revolution, therefore, an irreversible change in the world, the way of thinking, as well as that of leading society (p. 368). Observations indicate that this development could have profound implications for education (Meryzan B., 2022), communication and the construction of online identity capable of establishing determinants of a better future by creating more human awareness.

4. Need for Media and Technological Literacy: The increasing complexity of media and technology highlights the importance of media and technology literacy. The results underscore the need to empower people to understand and critically evaluate online information, as well as to adapt to technological and societal changes.

Final Thoughts/Conclusions

The exploration of Media Ecology (MS) and its relationship to transhumanism, the metaverse, and media and technological literacy has revealed a number of fundamental findings and reflections, pointing out the contributions, inferences, limitations, and directions for future research, establishing connections with the goals of the study.

Importance of Media Ecology (MS): Throughout this work, we have explored how MS, a discipline that examines the impact of tools, media, and technologies on society throughout history, remains relevant in the digital age Marshall McLuhan and Neil Postman, have provided a solid foundation for understanding how media influences perception, understanding, and human values. Their work remains essential in addressing contemporary challenges related to technology and media.

Positive and Negative Effects of MS: We have highlighted how MS has positive/negative effects on today's society, on the one hand, facilitating global collaboration, the formation of virtual communities and access to information, but also the spread of disinformation, polarization and digital addiction as detrimental effects. This highlights the need for a balanced approach to adapt and manage these impacts by applying academic training, with a focus on new perspectives. measuring the danger of various professions and avoiding collateral unemployment.

Importance of Media and Technology Literacy: Media and technology literacy is a critical tool to address the negative effects of MS by building critical skills, the ability to evaluate information, and time management as essential in the digital society. Education in these areas becomes crucial to empower people from their educational formation in the social context of and for life, applying active participation of digital culture with responsibility.

Importance of Media and Technology Literacy: Media and technological literacy is presented as a pressing need in a world characterized by media and technology saturation. Authors such as Livingstone & Sefton-Green and Henry Jenkins have championed the importance of media and technological literacy in the digital age. However, future research may focus on evaluating the effectiveness of existing literacy programs and developing more effective strategies in critical understanding of media and technology.

Revaluation of the Transhumanist Imaginary and the Metaverse: Within this discussion, the transhumanist imaginary and the concept of the metaverse have emerged as relevant topics. These raise fundamental questions about the relationship between technology and human identity (Acosta Rico, 2023). Educommunication must address these issues critically and ethically to guide the future of the digital society.

MS as a Tool for Reflection and Action: Ultimately, MS is not only a field of study, but also a tool for reflection and action (Bolonia y Montreal, 2002). It helps people understand how media affects their lives and make informed decisions about its use. This highlights the

importance of MS education and the need to promote strong media and technological literacy in society.

Relationship between MS and Transhumanism: McLuhan and Postman's studies in MS have provided a solid foundation for understanding how media and technology shape the perception of the world and culture. In this context, McLuhan's idea that "the medium is the message" takes on new relevance in the age of transhumanism. The debate over human enhancement and merging with technology raises questions about how these transformations will redefine human identity and values today. In this sense, they relate to works by authors, such as Roduit, (2016) in his book "The Case for Perfection" which addresses the ethical and moral dilemmas of transhumanism.

The Metaverse as a Space for Transformation: The emergence of the metaverse as a multidimensional digital space raises fascinating questions about the construction of digital identities and the evolution of online communication and culture. Authors such as Sucari Sucari et al. (2022), in their work "Impacts of the Metaverse on Society". They have explored the dynamics of online communities and how they influence everyday life. This suggests that the metaverse could be fertile ground for investigating how digital identities are intertwined with offline identities and how these platforms will impact society as a whole.

Limitations and Future Directions: A key limitation of this study lies in its qualitative approach based on literature review and critical analysis of sources. Although this provides a broad view of the issues, it does not include original empirical data. Future research could combine this approach with quantitative methods to gain a more complete understanding. In addition, it is important to consider cultural differences in the perception of these issues, which could be the subject of cross-cultural research.

Future Challenges and Opportunities: As technology continues to advance, MS will continue to evolve. Challenges include managing information overload, protecting privacy, and preserving cultural diversity. However, there are also exciting opportunities, such as the creation of new forms of cultural expression and the enhancement of online education.

This study has revealed the complex intersections between Media Ecology, transhumanism, the metaverse, and media and technological literacy. It has been related to the contributions of prominent authors in each field, noting both contributions and limitations. These findings suggest the need to continue researching and debating these issues in an ever-evolving world, while always maintaining a critical and ethical approach in exploring emerging technologies and their impact on society.

In summary, this work offers a solid foundation for addressing the challenges and opportunities that arise at the intersection of technology, media, and culture. Media and technology literacy stands as a critical tool for navigating this environment and making the most of its potential.

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