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Digital natives and their creativity: reflection of Logical-Mathematical Intelligence in an abstract woodcut

Los nativos digitales y su creatividad: reflexión de la Inteligencia Lógico-Matemática en una xilografía abstracta

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Abstract

Introduction: the study of an abstract woodcut supported the theme of digital natives and their creativity. In this way, Logical-Mathematical Intelligence was seen, within the socialization of the fable of digitalization and visual ability, as an attitude towards life. **Objective**: sketching actions, for the sake of woodcut visualization and deductive reasoning, framed in a dual reflection. **Method**: based on hyperconnectivity, being a chronological factor of integration and ingenuity, it was applied to divergent thinking. **Results**: the digitalizing expression, as the author of the messaging, helped with the prominence of cognitive participation and socialization demarcated creativity, as a sociocultural phenomenon, within the attitudinal development of any observer. As much as, the quantitative attitude and the systematized structure were empowered within a strategic planning. **Conclusion**: appealing to the method of premises, as an appendix to duality, logical reasoning was agreed upon in the existentialist theories of mental logic as complementary reasoning.

Keywords: creativity; digitalization; logic; mathematics; woodcut

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Resumen

Introducción: el estudio de una xilografía abstracta avaló a la temática de los nativos digitales y su creatividad. De este modo, la Inteligencia Lógico-Matemática fue vista, dentro de la socialización de la fábula de la digitalización y habilidad visual, como actitud de vida. **Objetivo**: bosquejar acciones, en bien de la visualización xilográfica y del razonamiento deductivo, encuadradas en una reflexión dual. **Método**: con base a la hiperconectividad, al ser un factor cronológico de integración e ingenio, se aplicó el pensamiento divergente. **Resultados**: la expresión digitalizadora, como autora de la mensajería, ayudó con el protagonismo de la participación cognitiva y la socialización demarcó la creatividad, como fenómeno sociocultural, dentro del desarrollo actitudinal de cualquier observador. Tanto cuanto, se facultó al talante cuantitativo y la estructura sistematizada dentro de la planificación estratégica. **Conclusión**: apelando al método de premisas, como apéndice de la dualidad, el razonamiento lógico se concertó en las teorías existencialistas de la lógica mental como razonamiento complementario.

Palabras clave: creatividad; digitalización; lógica; matemática; xilografía

Introduction

For the sake of this article, it was necessary to apply descriptive research, as a detail of analysis, when dealing with the subject of digital natives and their creativity. Thus, this research focused on the reflection of Logical-Mathematical Intelligence (LMI) about an abstract woodcut and to achieve this, the Web Bibliographic Information (WBI) was applied; where Scopus, ResearchGate and Zotero supported the reference literature and facilitated the citations. Subsequently, the Digital Object Identifier (DOI) index supported the effectiveness of this process; revealing the main objective and providing mathematical thoughts for the study of a lithograph. Considering, logic as a qualitative standard in the search for deterministic processes in pro of the visualization of a carved image.

Thus, at the beginning of the previous century, through social struggles and in front of the nascent peoples, equality of rights was anticipated as a transforming mechanism for a society that sought autonomy; both social and union. Therefore, this was the moment when, little by little, women achieved emancipation from sexism and

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from the canons that did not allow their development. Likewise, referring to the Second World War, which occurred between [1939,1945], the concept of information and its potential was compensated. Much later, with the interstellar trip, made by Apollo 11 in 1969, the new era began; baptizing color television and high-definition film productions. However, in this pair, imagination was latent; above all, with innovative technological creations to solve, apparently, unsolvable difficulties. Moment in which, the Cultural Revolution gave prelude to the universe of digitalization; thus, arriving at cutting-edge technology. Soon, it was no longer possible to maintain a socialization that encouraged the loss of intellectuality and therefore, 2009 was declared the year of creativity; inviting the development of critical thinking and opting for the resolution of digital conflicts. It is here, when the competencies of all interested users were defined; much better, if their skills guaranteed virtual environments. That is, they had an advantage over previous generations and existing social relations granted imperative management.

Insisting, as an objective, that contemporary generations set precedents within the technological era and promote incentives with creativity; without forgetting, the emerging flexibility and its adaptation to the environment. At the same time, that creative capacity is directly proportional to the cultural evolution of humanism (Houlihan *et al*., 2024; Prem, 2024; Shchavleva, 2024) and subsequently, digitalization is increasingly competitive. This happens to the extent that innovation tends towards specialization and the creative fields of Information and Communication Technologies (ICT) consent the link of the Internet to the expansion of the technological market. However, the environment supports the virtuality and socialization of digital natives; with their academic training. So, it is urgent that the implementation of ICT, within the social environment, discard obsolete methods in asynchronous environments and this is where cultural paradigms become present. Then, to reach this consensus, it is necessary to promote structural changes within a society that supplies new ideologies; putting aside archaic concepts.

Development

Based on the information contained in the World Wide Web (WWW), it is stated that every human being born after 1980 is considered a digital immigrant. Furthermore,

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indicating that technology, since that year, has advanced by leaps and bounds with the appearance of the Internet in everyday life. However, this dichotomy spreads edges; as much as, the digital divide contrasts contiguous generations. Thus, it is possible to assert that the terms 'digital native' was positioned, almost, a quarter of a century ago (2001) and since then, manual artifacts were eliminated; case of the remote control for conventional televisions. That is to say, that, from that moment, digitalization has taken over in predominant environments; much more, if there are people who have been born from the digital era. Noting that these generations live within this universe and cause the Smartphone to be a cutting-edge tool. Which, "…this is prone to handling by a human being; worse, if multimedia is taken as the basis of communication" (Yadav and Tiwari, 2023, p. 7).

Socialization of the Deterministic Fable of a Digital Native

Subsequently, every digital immigrant is a native. In the future, their work will be governed by digitalization and personal communication will be dominated by instant messaging, generating foreign content in multiple data oases. Previously, multitasking opened up prospects for technological misuse starting with the distortion of information contained on the World Wide Web. Likewise, in the social environment, there is a clear decrease in concentration and if we take the academy as an eloquent theme, we must recognize the poor participation of ICT within the educational-emotional environment of the student body. Then, this step must be weighed by digital migration, due to technological environments. Before, anyone who calls themselves a 'digital immigrant' must inevitably place themselves in a more natural environment and adapt to changes. Obviously, there will be resistance to sharing personal data; much more so, with its distribution. It is then that parallel processes must accompany the reflective difficulties in decision-making; especially in complex areas.

Noting that all of the above pose's challenges when faced with the traditional. However, as an illustrative example of woodcut, the sociocultural background in which we live produces cold social entities. Agreeing that they, must be able to acquire empiricism for the construction of knowledge and it is when tutors must be aware of the advantages that ICT offers in the smart classroom; more than anything, in collective

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dynamization. Therefore, "...this is the moment in which virtuality acts and promotes initiatives for correct cognitive participation; assuming a leading role" (Hocine and Sehaba, 2024, p. 189). Thus, up to this point, it is possible to argue a high degree of achievement of the social paradigm of creativity framed in digital interaction. However, there are authors who disagree on the subject of digitalization and its rotation in socio-cultural environments.[1] Consequently, the motivational aspect predominates in digital socialization and capacity begins its consolidation. That is to say, digital technology, in a constantly changing world, provides chronological generations and these, being autonomous, do not absorb social premises.

So, the conception of the terms ‘digital native’ comes from acculturation framed in collective interaction and its individual establishment in information 2.0; predicting the influence and behavior of its members. It is, also, noted that “…the individuality of the term ‘native’ establishes precepts in new scenarios. As much as, these promote learning processes and their systematization is prone to social integration” (Radianti *et al*., 2020, p. 23). But a connected society will always question technological paradigms and will require sections to maintain problem solving; based on Macro and Micro-cycles.

Social Precepts of Creativity as Attitudes of a Neglected Life

Real Academia Española (RAE), in the Tricentennial Edition, proposes creativity as a neologism recently incorporated into the Dictionary of the Spanish Language. Therefore, the underlying conception of this word would be 'creation' and the problems for the generalization of its concept would determine its complexity. However, "...the creativity, in a non-figurative sense, is the elaborate skill of a person who creates divergent thinking and possesses individual characteristics of flexibility" (Newton, 2024, p. 10). Likewise, it is stated that the word 'intelligence' is discordant with the qualities of a conforming and obvious social entity, ingenuity is the result of inspiration;

[1] It should be noted that the communicative attribution of ICTs strengthens communication between Social Networks (SN) and their antecedents, including the formation of concepts. However, to achieve this, a metacognitive orientation is necessary to develop a high level of communication skills and therefore, there are young people prepared to experience digital environments; demystifying virtuality with its advantages rather than its shortcomings. Though, digital hyperconnectivity is rarely associated with isolation and a fondness for gaming should rather be a strength in problem-solving. Therefore, in this area, the canons should not be attributed to a sector of the population or to digital ‘workers’ as members of the cybernetic universe; rather, they should be understood as the nascent metaverse and a technological world interconnected through pioneering devices; such as virtual reality headsets.

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which, contracts vast differences. Since, the behind-the-scenes of 'divine illumination' can be confused with schizophrenia; being complicated to evaluate. Nevertheless, behavior is a significant area that is not without importance and provides cognitive margins in favor of divergent thinking; prioritizing consensual solutions and providing axiomatic concepts on creative intelligence. As long as these words are not mutually exclusive and are sensitive terms when providing skills as life attitudes. That is to say, creative ideals are worthy of a nascent personality; finding capacities and enhancing them. Despite the fact that these are adaptations of the environment that empower life perspectives and equally, cognitive variables, being complex, give added value to a social entity; identifying its creative potential. The same which specifies a uniformity of concepts and makes globalization effective.

In addition, with what has been expressed, it would be a matter of empowering social entities that belong to the world of digitalization and not to the gifts obtained. So that, daily existence develops by uniquely challenging the sociocultural context as a systemic phenomenon. Moreover, seen from another perspective, a human being must be more creative if he manages to develop Scientific Research activities, undertake creativity in an unknown field and maintain rules to contribute material; as much as, generating novel ideals is not the result of chance. Encouraging perseverance in their work and reestablishing the concept that, for a person, it is an obligation to contribute wisdom. But this happens, regardless of the level of their attitudinal development when it comes to offering social progress.

In this sense, every academic center, such as a university, does not promote creativity or dogmatic communication. Because of this, it is impossible to equate the Knowledge Society (KS) with the existing technological context, since its support does not correspond to the institutionality of Edu-communication and even less, to its virtue. However, there is concern for its improvement; having a silent revolution that does not encourage sequentially. But to do so, it's essential to rediscover the way we think about emotional communication, reactivating and channeling sensitivity. However, for this purpose, it is essential to consider the passion for ‘a look at the world’ and to make room for reflections as collective sections of information; more than anything, of its

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massification. But, accepting the derivation of the student profile, as an exchange of interactive mediation, within Edu-communication; including the digital universe. Where a young person, in their behavior, must opt for a neutral view. To achieve this, they must incorporate digital media into society for technological purposes. "…matching instructional tactics on virtual platforms; in addition to propagating the lateralization of critical thinking, fostering creative processes and providing bivalent communication between classmates" (Dai *et al*., 2024, p. 421). Proposing the Logical-Mathematical environment as a component of Multiple Intelligences (MI) and quantifiers as a support for creativity; such as the visualization of an abstract woodcut.

Outline of Logical-Mathematical Intelligence within Visual Skill

First, this type of Intelligence has to be understood as, "…the generic dimension of impressions related to the logic of a symbolic action" (Setyadi *et al*., 2024, p. 34). Therefore, it is when quantification is made effective in the recognition of forms, the patterns of Logical-Mathematical reasoning and comes from a classification of MI, made by [Howard Gardner] in 1994, when outlining rational thought. This being a formal class of intellect that attests to abstract conceptualization; having complexity as its argument. At the same time, it admits precepts, in problem solving, by founding predominant canons framed in capacitive units and providing sensitivity, by affirming abstract theorems; such as, the visualization of an axonometric perspective. Thus, by applying the Intelligence Quotient (IQ), graphic taxonomies are also described in the arithmetic layout with mental acuity. In such a way that, together with the Linguistic Sciences, at least a representation of Natural Language Processing (NLP). In addition, it involves a high level of complexity within the numerical field and establishes intellectual relationships; by weighing intelligence with academicism. Noting that it relates it to scientific thought and demarcates quantifiable areas. Also, as expressed, it studies the abstraction of graphs and refers to their analysis. So, these cognitive skills enable the expenditure of complex abilities. Constituting deductive formalities, verifying hypotheses and distinguishing graphological patterns within mathematical thinking. That is, this is the moment in which logical thinking demonstrates itself and mathematical learning appears as a visuospatial skill. Favorably, this implies projective

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capacity as a mental competence; being located in the frontal lobe, the left parietal and the temporal areas in both cerebral hemispheres (Chan *et al*., 2020; Hallett *et al*., 2022; Ten Donkelaar, 2020). Subsequently, a social entity that has a high development of this intelligence has unique characteristics. For this cause, quantitative visualization operates logical reasoning and numerical analysis enhances hypotheses; then, that the proposed phenomena are assimilated. People with this trait tend to organize and solve dilemmas. At this point, mental calculations facilitate interest in the visual field, which facilitates the challenges of strategic reasoning.

Woodcut Visualization within Deductive Reasoning

In art, the xylographic technique is applied to wood engravings. Therefore, a xylography is a hand-carved pictogram and initially, using a matrix technique, it is carved with different kinds of ink; obtaining a model-type impression. Subsequently, just like a printer, a carver is a typesetter who outlines images on a canvas or linen cloth. Then, in high relief, he carves his creations in oak or maple; which are generally abstract. Therefore, these impressions can be classified as Thread and Testa. The first is a carving in the grain of a trunk and the other, being of high quality, a robust layout that persists over time. But if we look at its history, the xylographic technique comes from eastern countries; above all, from China. However, in the Netherlands and at the end of the 19th century, in 1898, the precursor of the most impressive xylography models in the history of humanity was born; [Maurits Cornelis Escher].

He himself, who demarcates, with prints of all kinds, the illustration of subliminal messages in imaginary worlds and composes impossible figures, through paradoxical spaces, within astral dimensions; which, for that time, was not usual. Though, his bold representations carry philosophical manifestations up to the present-day time; outlining sources of cosmic inspiration and regulating a correct visualization of his works. What's more, his lithographs were succinct as a product of his nightmares or schizophrenic visions; at least, that's what his harsh critic says. Since, his supposed introversion, "...offered a parallel universe where he lived and that made his power in duality more eloquent; exemplifying with the spaces, surfaces and planes that he captured in his pictograms" (Coltelli *et al*., 2020, p. 128). But his legacy is everlasting and his thought is

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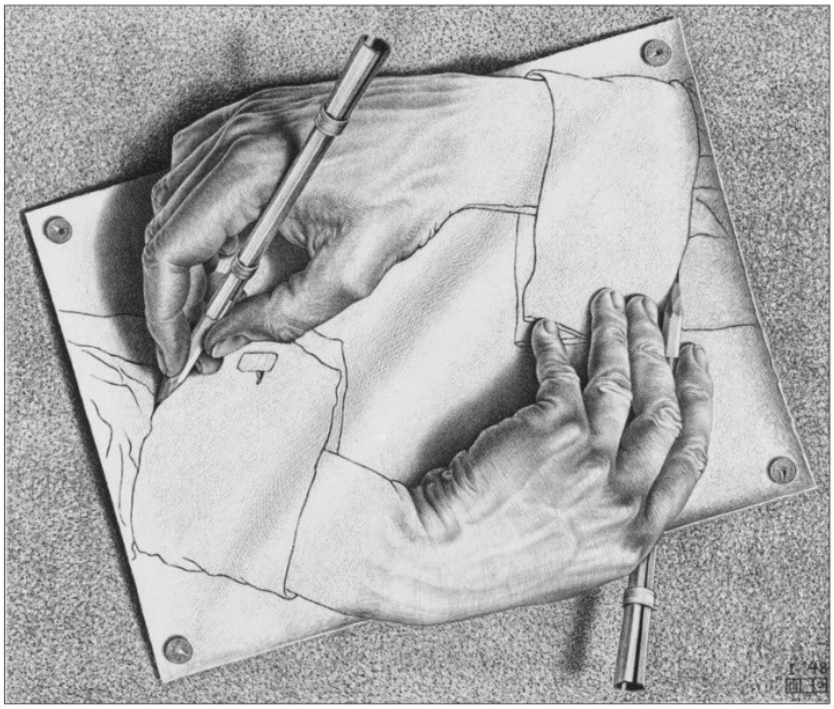
studied within the framework of the Exact Sciences; especially in Mathematics. But, to perceive its mosaics, it is essential to take into consideration the computational culture. Meanwhile, "…this pictographic conception must be framed in quantitative stimulus and projected in symmetrical patterns; requiring algorithmic methods" (Wang *et al*., 2023, p. 55). Congruently, as Figure 1 displays, it is possible to understand the nested recursion[2] procedures of strange loops. Furthermore, the study of pigments and tones in carving techniques requires time to learn; lithographic success also depends on systematic design and the preferred material: wood, stone, or metal.

Figure 1

Hands drawing (1948)



Note. Author: [Maurits Cornelis Escher] (Netherlands, 1898-1972).

Though, it is necessary to insist on the power of logical deductive reasoning as a theory of the mental model. More than anything, by declaring that this is the only means to obtain inferences and premises; these being tautological or contradictions. Even, it is a model opposite to the expansive one; providing data that are not found in the named premises. Remembering that Cognitive Psychology (CP) is responsible for conclusive arguments within the underlying techniques; adhering to theories of Mental Logic as a

[2] Syllabus, belonging to the subject 'Data Structure', of the Degree in Higher Engineering in Computer Science.

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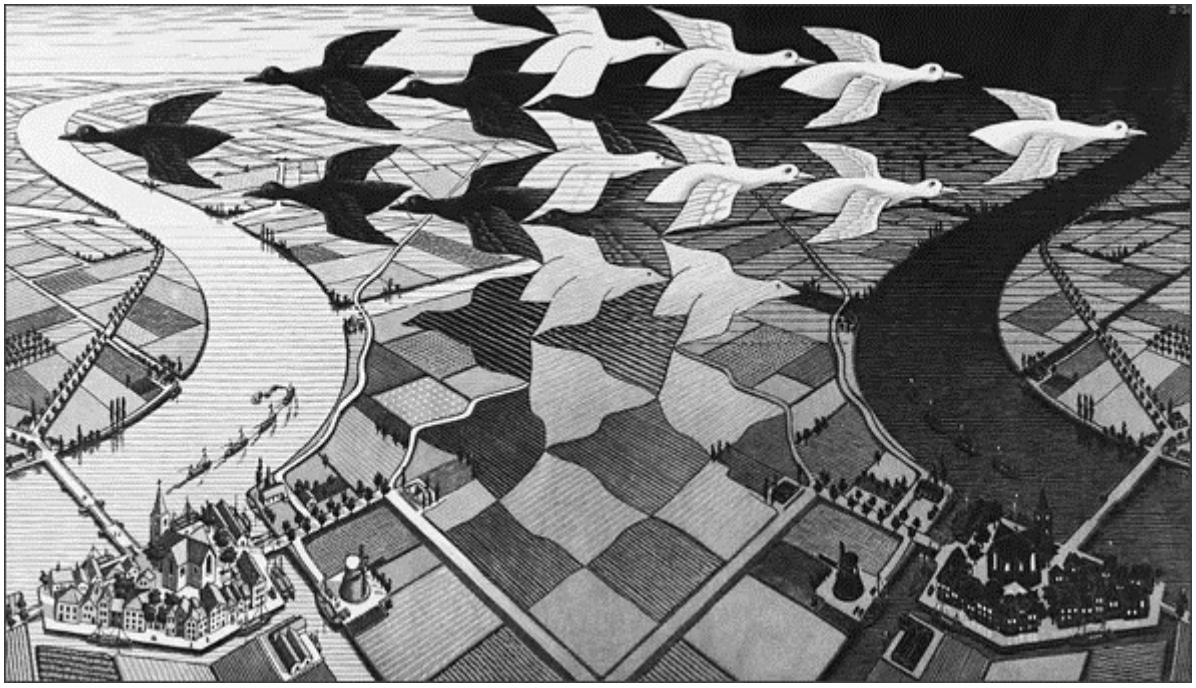
dual judgment. Advantageously, said reasoning and Social Epistemology are two branches that endorse the method of their philosophical belief as justification. Previously, "...the logical derivation is the consummation of the arguments and the circumstances that depend on the propositional syntax of each premise; but without depending on non-permitted compendia" (Caponigro, 2024, p. 761).

Thus, as a woodcut artist, the mention of Escher adds conceptual richness and the representation in Figure 2, as a visual schematic and second example, increases interpretations of his art; condensing abstract philosophy.

Figure 2

Day and Night (1938)



Note. Author: [Maurits Cornelis Escher] (Netherlands, 1898-1972).

Conclusions

A digital immigrant is a native who masters instant messaging and its misuse leads to information distortion; this is exacerbated by the introduction of the Internet. In other words, their concentration decreases, while it affects the emotional perimeter and technical environments become mutually exclusive. So, cognitive participation takes center stage and socialization demarcates creativity. However, metacognition offers insights from its context and its influence denotes cultural processes. In this way,

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hyperconnectivity is integrated into a social community.

Regarding creativity, it can be concluded that it is the capacity of a social entity to think divergently about the results of its inspiration. While ingenuity arises from the flexibility of concepts, assessing it is a difficult process within the axiomatic contribution of Logical-Mathematical Intelligence. Then, to achieve this, dogmatisms are promoted that facilitate sensitivity and neutral reflection. Therefore, it is evident that the level of complexity lies within the realm of numerical thinking.

Finally, the visualization of woodcut and its deductive reasoning are supported by the carving technique. So much so that it is a matrix diagrammed by a typographer; in the style of a printing press. The image is subsequently captured in high relief and carved in oak. But, this art has as its icon Escher; who composes creations surrounded by abstraction. However, to understand his mosaics, their symmetrical patterns must be considered. In addition, deductive logical reasoning and adherence to the theories of mental logic must be considered. Thus, psychology begins with a cognitive process and ends with an abstract formal system.

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Interest conflict

The authors declare no conflicts of interest.

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