6.–7. oktober 2025 | 6–7 October 2025
Ljubljana, Slovenia

INFORMACIJSKA DRUŽBA

INFORMATION SOCIETY

Kognitonika

Cognitonics

Urednika | Editors:
Vladimir A. Fomichov, Olga S. Fomichova

Zbornik 28. mednarodne multikonference

Zvezek M

Proceedings of the 28th International Multiconference

Volume M

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PREDGOVOR MULTIKONFERENCI INFORMACIJSKA DRUŽBA 2025

28. mednarodna multikonferenca *Informacijska družba* se odvija v času izjemne rasti umetne inteligence, njenih aplikacij in vplivov na človeštvo. Vsako leto vstopamo v novo dobo, v kateri generativna umetna inteligenca ter drugi inovativni pristopi oblikujejo poti k superinteligenci in singularnosti, ki bosta krojili prihodnost človeške civilizacije. Naša konferenca je tako hkrati tradicionalna znanstvena in akademsko odprta, pa tudi inkubator novih, pogumnih idej in pogledov.

Letošnja konferenca poleg umetne inteligence vključuje tudi razprave o perečih temah današnjega časa: ohranjanje okolja, demografski izzivi, zdravstvo in preobrazba družbenih struktur. Razvoj UI ponuja rešitve za številne sodobne izzive, kar poudarja pomen sodelovanja med raziskovalci, strokovnjaki in odločevalci pri oblikovanju trajnostnih strategij. Zavedamo se, da živimo v obdobju velikih sprememb, kjer je ključno, da z inovativnimi pristopi in poglobljenim znanjem ustvarimo informacijsko družbo, ki bo varna, vključujoča in trajnostna.

V okviru multikonference smo letos združili dvanajst vsebinsko raznolikih srečanj, ki odražajo širino in globino informacijskih ved: od umetne inteligence v zdravstvu, demografskih in družinskih analiz, digitalne preobrazbe zdravstvene nege ter digitalne vključenosti v informacijski družbi, do raziskav na področju kognitivne znanosti, zdrave dolgoživosti ter vzgoje in izobraževanja v informacijski družbi. Pridružujejo se konference o legendah računalništva in informatike, prenosu tehnologij, mitih in resnicah o varovanju okolja, odkrivanju znanja in podatkovnih skladiščih ter seveda Slovenska konferenca o umetni inteligenci.

Poleg referatov bodo okrogle mize in delavnice omogočile poglobljeno izmenjavo mnenj, ki bo pomembno prispevala k oblikovanju prihodnje informacijske družbe. »Legende računalništva in informatike« predstavljajo domači »Hall of Fame« za izjemne posameznike s tega področja. Še naprej bomo spodbujali raziskovanje in razvoj, odličnost in sodelovanje; razširjeni referati bodo objavljeni v reviji *Informatica*, s podporo dolgoletne tradicije in v sodelovanju z akademskimi institucijami ter strokovnimi združenji, kot so ACM Slovenija, SLAIS, Slovensko društvo Informatika in Inženirska akademija Slovenije.

Vsako leto izberemo najbolj izstopajoče dosežke. Letos je nagrado *Michie-Turing* za izjemen življenjski prispevek k razvoju in promociji informacijske družbe prejel **Niko Schlamberger**, priznanje za raziskovalni dosežek leta pa **Tome Eftimov**. »Informacijsko limono« za najmanj primerno informacijsko tematiko je prejela odsotnost obveznega pouka računalništva v osnovnih šolah. »Informacijsko jagodo« za najboljši sistem ali storitev v letih 2024/2025 pa so prejeli Marko Robnik Šikonja, Domen Vreš in Simon Krek s skupino za slovenski veliki jezikovni model GAMS. Iskrene čestitke vsem nagrajencem!

Naša vizija ostaja jasna: prepoznati, izkoristiti in oblikovati priložnosti, ki jih prinaša digitalna preobrazba, ter ustvariti informacijsko družbo, ki koristi vsem njenim članom. Vsem sodelujočim se zahvaljujemo za njihov prispevek — veseli nas, da bomo skupaj oblikovali prihodnje dosežke, ki jih bo soustvarjala ta konferenca.

Mojca Ciglarič, predsednica programskega odbora
Matjaž Gams, predsednik organizacijskega odbora

FOREWORD TO THE MULTICONFERENCE INFORMATION SOCIETY 2025

The 28th International Multiconference on the Information Society takes place at a time of remarkable growth in artificial intelligence, its applications, and its impact on humanity. Each year we enter a new era in which generative AI and other innovative approaches shape the path toward superintelligence and singularity — phenomena that will shape the future of human civilization. The conference is both a traditional scientific forum and an academically open incubator for new, bold ideas and perspectives.

In addition to artificial intelligence, this year's conference addresses other pressing issues of our time: environmental preservation, demographic challenges, healthcare, and the transformation of social structures. The rapid development of AI offers potential solutions to many of today's challenges and highlights the importance of collaboration among researchers, experts, and policymakers in designing sustainable strategies. We are acutely aware that we live in an era of profound change, where innovative approaches and deep knowledge are essential to creating an information society that is safe, inclusive, and sustainable.

This year's multiconference brings together twelve thematically diverse meetings reflecting the breadth and depth of the information sciences: from artificial intelligence in healthcare, demographic and family studies, and the digital transformation of nursing and digital inclusion, to research in cognitive science, healthy longevity, and education in the information society. Additional conferences include Legends of Computing and Informatics, Technology Transfer, Myths and Truths of Environmental Protection, Knowledge Discovery and Data Warehouses, and, of course, the Slovenian Conference on Artificial Intelligence.

Alongside scientific papers, round tables and workshops will provide opportunities for in-depth exchanges of views, making an important contribution to shaping the future information society. *Legends of Computing and Informatics* serves as a national »Hall of Fame« honoring outstanding individuals in the field. We will continue to promote research and development, excellence, and collaboration. Extended papers will be published in the journal *Informatica*, supported by a long-standing tradition and in cooperation with academic institutions and professional associations such as ACM Slovenia, SLAIS, the Slovenian Society Informatika, and the Slovenian Academy of Engineering.

Each year we recognize the most distinguished achievements. In 2025, the Michie-Turing Award for lifetime contribution to the development and promotion of the information society was awarded to **Niko Schlamberger**, while the Award for Research Achievement of the Year went to **Tome Eftimov**. The »Information Lemon« for the least appropriate information-related topic was awarded to the absence of compulsory computer science education in primary schools. The »Information Strawberry« for the best system or service in 2024/2025 was awarded to Marko Robnik Šikonja, Domen Vreš and Simon Krek together with their team, for developing the Slovenian large language model GAMS. We extend our warmest congratulations to all awardees.

Our vision remains clear: to identify, seize, and shape the opportunities offered by digital transformation, and to create an information society that benefits all its members. We sincerely thank all participants for their contributions and look forward to jointly shaping the future achievements that this conference will help bring about.

Mojca Ciglarič, Chair of the Program Committee
Matjaž Gams, Chair of the Organizing Committee

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FOREWORD / PREDGOVOR

Eighth International Conference on Cognitonics - the Science about the Human Being in the Digital World (Cognit-2025)

Since October 2009, the international scientific conference on Cognitonics ("Kognitonika" in Slovenian) is a part of the international scientific multiconference INFORMATION SOCIETY (Slovenia, Ljubljana, Jozef Stefan Institute).

The papers presented at seven previous conferences on Cognitonics were submitted by the scholars from 25 countries located in five world's parts: Africa (Botswana), Asia (India, Japan, Lebanon, Pakistan, PR China), Europe (Belgium, Bulgaria, Croatia, Cyprus, Germany, Greece, Finland, France, Italy, North Macedonia, Poland, Romania, Russia, Slovenia, Sweden, United Kingdom), North America (Mexico, USA), South America (Brazil).

Let's consider the principal ideas caused the birth of a new scientific discipline – Cognitonics, or the science about the human being in the digital world.

The digital space is the product of genial guesses and great projects of the brightest brains of mankind independently on their national identity and location. In modern digital reality one human being opposes the whole community of the brightest brains of mankind. Their choice, values system, the conceptual world's picture, even their vision of creativity are dominant and only real, because, in essence, these things underly the software of various applied computer systems.

But what is lack in digital environment? It doesn't create living nature, doesn't consider nature as a clever dialogue partner (because it has no need of a dialogue partner, it is self-sufficient), it is not inspired by the beauty of nature, because the digital space is generated by the brains of the human beings, and it has no soul, this category is absent.

The culture as a result of speculating about the world by the human being (expressed by means of natural language, language of music, language of painting, language of dance and other symbolic languages) is the next reality not existing in the digital space, because it is a creation of the human being inspired by all things he/she is surrounded.

As a consequence, realizing the processes of education, up-bringing, and socialization, we should take as the allies the culture and nature in order to change the scale of the personality and to lift the human being by means of the height of the thought, the deepness of feelings (i.e., emotional manifestations), moral demands to the personality to the level allowing us to use the digital space for the good of mankind.

In the foreword to the Proceedings of the Sixth international conference Cognit-2019, we formulated the following expanded definition of Cognitonics: it is the science about the trajectories of raising the human being to such level of intellectual and spiritual height where the scale of his/her personality becomes proportional to the scale of the digital world.

The first objective of Cognitonics is to explicate the distortions in the perception of the world caused by the information society and globalization. The second, principal objective of Cognitonics is to cope with these distortions in different fields by means of elaborating systemic solutions for compensating the negative implications of the kind for the personality and society, in particular, for creating cognitive-cultural preconditions of the harmonic development of the personality in the information society and knowledge society and for ensuring the successful development of national cultures and national languages.

The goal of the conference is to combine the efforts of the scholars from numerous scientific fields and educators in order to establish a new synergy aimed at ensuring the harmonic, well-balanced development of the personality, national cultures, and national languages in the forming knowledge society (smart society) and, as a consequence, to compensate a number of broadly observed negative distortions.

From the standpoint of educational practice, Cognitonics suggests an answer to the following question: what precious ideas and images accumulated by the mankind, at what age, and in what a way are to be inscribed into the world's conceptual picture of a person in order to harmonize his/her intellectual and spiritually-coloured emotional development and to contribute to the successful development of national cultures and national languages?

Cognitonics formulates a new, large-scale goal for the software industry and Web science: to develop a new generation of culture-oriented computer programs and online courses (in the collaboration with educators, linguists, art historians, psychologists) - the computer programs and online courses intended for supporting and developing positively-oriented creativity, cognitive-emotional sphere (or emotional intelligence), the appreciation of the roots of the national cultures, the awareness of the integrity of the cultural space in the information and smart society (knowledge society), and for supporting and developing symbolic information processing and linguistic skills, associative and reasoning abilities of children and university students.

Being a relatively young scientific discipline, Cognitonics both is of high social significance just now and has great prospects of the kind. It is due to the fact that it suggests new, deep and constructive ideas, new angles of look and original, effective solutions to a number of socially significant problems emerged in adjacent fields, including education.

The Program Committee accepted for the conference 11 papers from 9 countries: Croatia, Germany, Greece, Italy, Japan, Russia, Sweden, United Kingdom, USA.

The editors would like to thank the authors of the papers for their contributions and the members of the Program Committee for their precious comments ensuring the high quality of the accepted papers and making the reading as well the editing of this volume a rewarding activity.

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Learn from Corona Pandemic 2020 to Update Mentality with Artistic Narratives for Face Changing Environmental Conditions

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Abstract

Although it showed during pandemic that artworks communicate consolation that help human minds during straining circumstances, the opportunity to learn from this apart from some exceptions[1] has not effectively been taken into consideration even by sciences. Artistic narratives can be very helpful for learn, reflect, and communicate stimuli. If an "empathic esthetics" is recognized, they can show paths for problem solving. Photos picked out of visual stories will document an individual attempt to demonstrate examples of both: narrative artwork used as metaphor and performance artwork. Discrepancies and possible effects by combining are described. Some difficulties for communicating understanding and individual findings are explained.

Keywords

Corona Pandemic, artistic narrate, visual story, esthetic empathy, habitual behavior of living beings, proceeding metaphors

1 Introduction

Corona Pandemic had serious effects globally. Ás regards financial data, one noted that the countable monetary effects of this pandemic were smaller than those of the financial crisis 2008[2].
During the years 2020 - 2021, many scholars from various countries studied the influence of the corona virus pandemic on the cognitive-emotional sphere of children and adolescents, on the development of their negative attitude to the world. In particular, the papers [1], [2] explicate, first of all, such negative phenomena as high rates of anxiety, depression, stress. The authors of [1] underline the significance of helping children and adolescents to deal with mental health burden of the pandemic.

As far as the psychic effects are concerned, attempts to analyze cannot be complete. This is so, because individual reactions to the unforeseeable and unexpected only become recognizable in the event of a disaster. This also applies to the person(s) affected by a disaster.

Noticeable during and after pandemic were:
(1) immediate responses to danger guided by reason and quick reaction by science,
(2) paradoxical effects of denial that endangered communities,
(3) artistic reactions aimed at heal by communicating during dangers and isolation according to the guideline: consoling oneself by consoling others. Esthetic empathy in this context is both: a topic for studies in sciences as well as a reason for artistic research and artistic output in artworks.
As a way out, several scholars came to the conclusion that it is necessary to elaborate special emotional and creative props for children and adolescents in the situation when they are bereft of off-line group activities, such as round table discussions, sport events and creative contests, parties, balls, museums, and round table discussions.

One of the first original props of the kind called the Method of Cognitive Painting was suggested by O.S. Fomichova and V.A. Fomichov in the Proceedings of the Seventh International Conference on Cognitonics [3]. The essence of this method is as follows: several slots are constructed within the frame of the known poems in order to make children fill the slots, occupy all the space in these cognitive slots with descriptions and metaphors based on their own way of viewing the given entity or subject under discussion.

The method develops the ability to create a positive cognitive-emotional space for young children and adolescents (without using virtual reality), using thought-provoking cognitive activity leading to strong emotions and, as a result, leaving a semantic trace and evoking overwhelming fruitful spiritual and intellectual life for each personality and for community in general [3].

A study described below continues the line of [4] and belongs to the same direction of creating emotional and creative props for helping children, adolescents, and adults to overcome a negative moral state caused by corona virus pandemic. The suggested prop was realized with the help of bright pictures.

2 Method

Due to its difficult documentation, only few artistic reaction is noticed by analysis and the like. Nevertheless, in Germany Corona led to a rise of consciousness of the positive influence of art and esthetics in critical situations. Such recognizing the importance of arts by the loss of the accessibility of artworks might have been highest during pandemic since known for WWII[3].

[1] like Cognitonics
[2] https://www.zvei.org/themen/globale-kosten-der-corona-pandemie
[3] Disregarding ecologic consequences Culture Tourism quickly reacted to this global longing

Thus, it might be a legitime way to draw conclusions from own experience if methodical background and statistical proof are insufficient, difficult to access or even lacking.

At Corona time I made photo-stories that I circulated to keep in touch as well as for share useful observations while real contact was a problem. In the following I will show images selected from visual stories.

3 Examples from Observation

1. **Visual story *Tulips*, spring 2020, concerns plants behavior**

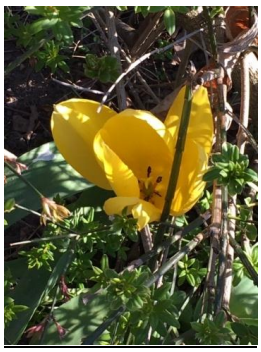

Figure 1: *Tulip*s, Sheltered

Figure 2.:*Tulip*s, Windshaken

Figure 3: *Tulips*, Embedded face stormy weather

Most recipients understood the story's aim to inform as well as console. Many responded more or less hopeful, confirming verbally the visual observations and their conclusions. Yet only one person responded by artistic medium.

It was an artist and scientist who reminded of a song from the 1960ties he did not know whether I was familiar : Tiny Tim's[4] *Tiptoe Through the Tulips*:

Tiptoe through the window
By the window, that is where I'll be
Come tiptoe through the tulips with me
Oh, tiptoe from the garden
By the garden of the willow tree
And tiptoe through the tulips with me[5]

The onomatopoeic word tiptoe brought lightness into an environment globally made heavy by fears. For me this wording, the music and the rhythm guided into a fairy-tale atmosphere just as the dancing students YouTube-video Moskow 2020 did[6]. This imagined escape on tiptoe through the window led out of the prison walls of felt danger, a consciousness that had initiated for many paralyzed waiting for danger's end. By reliving fiction, both positive sensual esthetic and joyful imagine could open up. In other words, thinking ahead was stimulated by keep actors – here plant and reflecting human – yet change medium. The abstract metaphor fixed by photo was complemented by an artist's multimedia response using a corresponding music performance. Recognizing the possibility to move on derived from listening to a work of art. Art perception helped to distance from the factual environment - depicted in my photographs - in order to restore in mind the potential of other options, based however on past experience easy to connect.

This distancing and at the same time stimulating by familiar music performance – comparable in lightness of humor and elegance of affection to the Spring BallWaltz 2020 - for me personally was more helpful than any other response. No matter how many well-intentioned and informative words were exchanged and received, only the gift of remind a joyful work of art inspired to mentally move on. In this way, works of art, regardless of medium and time of creation, can stimulate further thought and action instead of remaining trapped in states such as fear and sadness, habit and aggression.

On the other hand, artworks are also able to irritate and in such way trigger reflect critically. Then they are even able to interrupt states of a too easy and superficial living in so-called wellness/happiness by open recipients' minds for a more senseful life.

2. **Visual story *Freedom and the heron*, summer 2020 concerns animal behavior**

[4] https://en.wikipedia.org/wiki/Tiny_Tim_(musician)
[5] You can hear this with printed text https://www.youtube.com/watch?v=_eQQKVKjifQ
[6] https://www.youtube.com/watch?v=JHg-SfeQVyY

Figure 4 : *Freedom*…., Goldfish

Figure 5: *Freedom*…, Move forward

Figure 6: *Freedom*…, Move backward

Figure 7: *Freedom*…, Dependance Cage (children's swing)

This photo-story documents the behavior of a heron at a pond and was assamblaged with photos of protective measures concerning a children's playground. Both photo sequences were made at the same time in the same park, later than the Tulip story, but still in the first half of 2020:

As in a fable, the combined documentaries link the behavior of animals with that of humans. I remember during documenting the heron's behavior the intense feeling that the repetition of its goals (goldfish understood as a metaphor) and its gait (forward backward) was a prison for creativity.

Here, the humor of the visually documented, self-made human "double cages" in the playground was recognized and shared by a performance artist, artists who are particularly aware of time in flux through own professional actions. I can't re-find other reactions to this story in my notes, there might have been few. Perhaps the hint: "Repetition can be a cage" was not accessible or too difficult to follow when comparing mixed documentary photos connected to pandemic context by visual metaphor only.

These two visual stories are selected examples of 2020 observations. All in all, the unusual experiences of this time motivated me to design a more complex story in media that are less structured than traditional photo-documentation. Therefore, they offer more possibilities for continuing by adapt and move on.

4 Example of Learning by Recycling Artworks

For the 3rd visual story, I re-used own artworks from the past by re-shaping them medially. The adaptive recycling method was chosen out of the urge to better understand the framework conditions of living beings by using the well-known as variable. The aim was to understand by update and supplement what lies behind what people are used to appreciate as so-called "normality". It seemed important to recognize why so many esteem habitual behavior as self-evident necessity, obligation and role model despite factual environmental changes

1. **Visual story *Where do we come from, what are we, where are we going*, December 2020 concerns human behavior**

Figure 8: *Where* …untitled

Figure 9: *Where*…untitled

Figure 10: *Where*…untitled

Figure 11: *Where*…untitled

My own awareness of differences in perception arose already in childhood and was affirmed by restoration profession. During Corona time it was re-triggered by a collaboration in which my task was to express an abstract theory visually by drawings. It was a long road to mutual understanding, but in the end a first approach was triggered by a tool, a cogwheel, which I had once drawn in a story for my nephew[7].

Figure 12: *Cogwheel*, Hierarchy

The visual story *Where do we come from...* concerns human characteristics sketched in own artworks, whose minimized printed copies I cut out and resettled into collage and mobiles. I could not find in my notes a reaction to this story.

The end of the story is of course not fixed, it is a "proceeding metaphor", a metaphor in adaptive progress so to say. Only recently I picked out three images for a picture story aimed at console bereaved family members and myself because of losing a beloved person to death. In this topical recycling a frog hops out of a box and explains three images to the mourners.

Figure 13: *Where…*,
I quote the frog: These are humans, says the frog. They are connected to all other living beings.

Figure 14: *Where…*,
Everyone has to hop, slide and quack their way through the ups and downs of life.

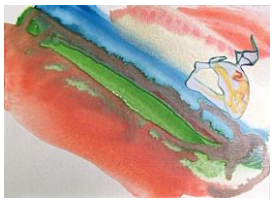

Figure 15: *Where…*,
I am (the late person's) ambassador and his message is: I LIKE TO BE HAPPY!

5 Conclusion

The longer pandemic blocked communication, the more lament and deny reality rose their lazy heads during and after lockdowns Many filled the waiting time of their hope for return of so-called "normality" with own interests. Nevertheless, this time could have been used to reflect and restructure endangered nature-systems for the benefit of all life on earth. As far as I know, the necessity to face the challenges of climate change was well-known since the 1970s. Still the strain of isolation was opposed only by a few people in my acquaintance - mainly artists - by counter-acting and/or used for communicating in view of predictable future challenges. More habitual were loudly lamenting and scapegoating.

[7] 1984

Thus, the immense burden of responsibility during and after lockdowns up till now was left on the shoulders of traditional indispensable “care professions”. Although efforts are being made, there is still a global lack of lessons learned across all care systems. If you link the word careful to care, however, the range of care systems is enormous, concerning not only culture and health but also economy, ecology, etc.

Maybe the common human habit of being fixed in waiting and/or in repeating is related to human focus and rely on self-made technique for problem-solving.

Today human dependence on self-invented technique is evident and human fears can be explained by dangers like those of pandemic. Our innate instincts, however, cannot face the speed our self-made tools have obtained. As their invention is related to both changing and unchanging human character traits, culture and civilization cannot suppress archaic behavior. Despite technical developments, any ethical crossroad - if recognized - still demands a "Herculean" decision. Such condition the arts can and always try to express.

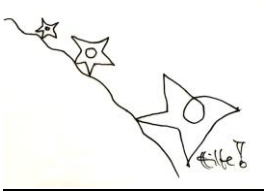

Figure 16: *Cogwheel,* Hilfe/Help

It seems self-evident that artistic narrative can be more useful than abstraction for reconciling discrepancies. A story can be interpreted depending on the present state and environment. It is flexible and consciously or unconsciously adapted. It can also be varied by fragmentation and/or additions in a kind of patchwork process. However, one must recognize and accept the past as a factor shaping the future, as is common in the will to restore. Only with caring intention does any artistic narrative structure help to imagine and even test the balance between reality and possibility.

Acknowledgments

I thank Dr. Vladimir Fomichov and Dr. Olga Fomichova for the opportunity to share these thoughts in the context of Cognitonics and for their precious help.

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New Approaches to Ecosystem Revival in Today's World

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Abstract

In addressing the challenges and prospects of knowledge and social learning in today's digital age, this work aims at exploring the potential and opportunities of various experiential pathways developed through Action Research Processes conducted within diverse living environments across the contemporary world. Our initiatives have been shaped by the ecological characteristics and dimensions of these environments, viewed as integral and authentic components of the Ecosystems of Nature and Mind that constitute the Biosphere. These systems—conceptualized as Human/Society/Environment Ternary Eco-Systems and historically framed within the field of Human Ecology (UNESCO, 1960s)—are currently undergoing an epochal crisis in light of the growing dominance of the Digital World. This crisis could potentially lead to the complete subordination of the Natural World to Digital Systems. However, it also presents an opportunity to cultivate new Ecosystemic dynamics—self-generated and self-regulated—within Human/Society/Environment Systems, offering a transformative process in which we can all engaged.

Keywords

Living environment, digital world, social knowledge, action writing, action research, generative artificial intelligence, second order cybernetics

1 Introduction

As it is widely recognized, the contemporary Living World—subject to the increasingly rapid transformations of both its *natural and mental environments*—is being progressively shaped by the pervasive influence of the Digital World. This influence risks severing the connection with the vital structure of the Biosphere from which it originated, paving the way for a full-scale technological and digital artificialization that could threaten its autopoietic nature. Simultaneously, however, the digital realm is producing new approaches to understanding the phenomena of life, along with scientific and technological tools capable of engaging with these processes in an interactive and dialogical fashion. These developments have the potential to align with the autopoietic dynamics that give rise to all forms of Life and Thought, manifesting as G. Bateson taught us in continuous interplay from Nature to Mind [1], from molecules to Human Societies—constituting what we refer to as Human Ecology. The future remains open, and our collective engagement is essential.

In this article, we aim to demonstrate how Human Ecology, when adopted as both the foundation and conceptual framework of our research, reveals significant strategic value in the face of contemporary crises.

We pursue this through non-linear, emergent pathways—within a game whose rules evolve in the process of Play, and are constantly subject to revision. This Play is triggered by an emotional and affective engagement with the encountered contexts, facilitating ever-novel transformations of living, learning, and knowledge environments.

A brief review of recent digital innovations—in terms of both tools and methodological approaches—will serve to frame possible pathways for evolutionary interaction between the Living World and Digital environments. In particular, we refer to the enlightening reflections found in the article "Cybernetics of Action Writing [2] as a conceptual reference point for these emerging perspectives.

This article and the article [3] describe our project aimed at ecosystem revival in today's world. The section 2 of the present article sets forth epistemological foundations of our project. It presents a concise general epistemological framework within which the ecosystems of the Biosphere are structured and sustained over time. The section 3 of the present paper relates to the new digital revolution. The concept of Action Writing, within Second-Order Cybernetics, reveals how Generative Artificial Intelligence (AI) can interact with the relational dynamics of living systems to support knowledge, creativity, and reflexivity—mirroring natural processes and offering new tools for Human Ecology.

The first part of the article [3] outlines human ecology practices in Italy and Europe (1990s–2020s) developed through context-specific Action Research approaches that reconnected local environments—urban, rural, and natural—to the dynamic principles of the Biosphere. The second part of [3] discusses an ongoing Action Research initiative for the ecological renewal of the Florence–Prato–Pistoia metropolitan area, where Human Ecology and advanced digital technologies could participate in the co-evolution of an emerging intermunicipal ecosystems. We examine several concrete cases previously implemented, as well as the evolving case of the Metropolitan Ecosystem, which remains open to new horizons of Participatory Solidarity-Based Action Research.

2 Our Epistemological Foundations

A concise epistemological framework can help clarify the motivations that have inspired our activities and underpin all the Ecosystemic Research Actions through which we emerge and take breath**.**

The Biosphere constitutes our living world—the Womb Ecosystem"—from which all life dynamics on our planet originate. It is itself immersed in, sustained by, and cradled within the living—yet still largely unknown—universe to which we belong. This living world—the Biosphere—is now recognized as a Ternary Ecosystem composed of Human Beings/Society/Environment, within which the spontaneous dynamics and interactions characteristic of its various components have developed and evolved.

Based on what we currently know—and continue to discover—about the nature of our world and its becoming, it is through these prerogatives—inherent in every disordered and complex system—that the Biosphere gives rise to ever more intricate and unpredictable Relationships and Configurations. These are, in turn, influenced by other disordered and complex systems that form part of our planetary ecosystem. This interplay generates an increasingly intricate balance of *stationary states* and *evolutionary dynamics*, which characterize and sustain every dimension and constituent of such systems and the ecosystems that emerge from them**.**

2.1 Ecological, Human and Natural Dynamics in the *Womb* of our Ecosystems

This section explores the interplay between human cognition and natural systems within the Biosphere, emphasizing how the emergence of human consciousness has introduced Mind into Nature—shaping a new Man/Society/Environment (M/S/E) Ecology. While human abstract thought has amplified natural evolutionary dynamics, the dominance of artificial mechanisms—driven by economic and technological logics—now risks compromising the autonomy of living systems. Drawing on insights from philosophy, art, and science, the text underscores the inherent cyclicality and relational complexity of all ecosystems as foundational to their evolutionary and co-evolutionary processes.

2.2 Ecosystem as a Cycle of Cycles and a Relation of Relations

"*The world is everything that happens"*[1] and it is this totality that cyclically perpetuates itself without ever repeating, generating dynamics and interactions that accompany and sustain systems in their becoming, moving toward ever-new levels of complexity while never altering their original prerogatives.

Thus, the diverse entities that constitute the Universe remain immersed in the dark and still-unrevealed matrix that makes up 80% of the known Universe—of galaxies, stars, and the planetary systems to which they belong, including our own Bio-Eco-sphere. Philosophical and scientific research—particularly in physics—which has long underpinned and inspired our understanding of the world, has led human knowledge through a grand Cycle of Relations of Relations, as expressed in Thought and Artistic Creation.[2]

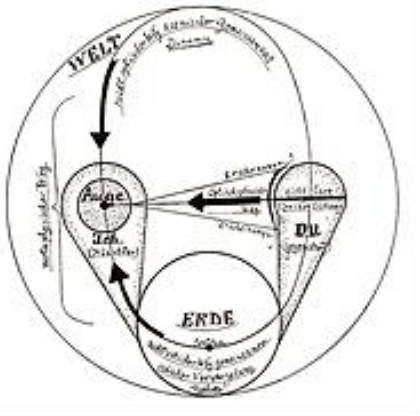

Figure 1: Drawing on P. Klee's notion of 'thinking in images' (Il pensiero figurante), the world and knowledge are understood as being in constant dynamic and cyclical interplay.

Despite persistent threats of oversimplification and intensification, this great cycle has endured for over twenty-five centuries, enabling the world to evolve in the ways and temporalities we witness today.

Contemporary physics, in particular, has reconnected with the living world by reintroducing complexity and reconsidering the relational dynamics that link disordered and complex systems within the same evolutionary integrity that characterizes all living systems. In this view, the dynamics of motion, variation, and difference; the cycles, flows, resonances, contrasts, and extremes that underpin our world and shape the countless ecosystems that emerge, organize, or collapse within our living environments—these become fundamental for constructing a new Ecosystemic social knowledge.

Within it, the art and philosophy of nature—together with the insights of contemporary physics—can contribute to the emergence of a new reality of Relations, Research, and Action, supported by technologies suited to complexity and economies appropriate to the multiplicity of phenomena shaping the processes of contemporary becoming.

As in the past, so too today, technologies and inventions—ranging from the wheel, money, and the triangular sail to steam power and the tools of the digital revolution—have sustained and accelerated the processes of transformation and evolution of human societies in relation to their living environments. Yet they continue to advance like tightrope walkers along a narrow ridge, from which they may slip—destroying, exacerbating, and distorting the delicate balances of ecosystems, even to the point of undermining the very artificial environments that produced them.

These same artificial environments—now increasingly resembling a global megalopolis— are becoming densely

[1] L. Wittgenstein, *Tractatus logico philosophicus*

[2] P.Klee, *Das Bildnenrische Denken*

populated by growing numbers of individuals and citizens, who paradoxically find themselves ever more isolated within these overpopulated urban landscapes.

3 New Revolution in the Digital World

As it is well known, the increasingly accelerated advances in digital technologies have progressively influenced the living world. The mechanics of externally controlled digital tools are gradually replacing the autopoietic dynamics intrinsic to all living beings. At the same time, however, they facilitate digital processes of research development and communication. The digital tools widely used thus far—particularly Artificial Intelligence and first-order cybernetics—tend to foster the illusion of enabling social control over the world at every level: from Genetics to Economics, from Healthcare to Research, and even in relation to Human and Environmental Rights. Yet, these tools simultaneously risk subordinating all phenomena of the living world to the logic of money and financialisation.

Thus, while on one hand, digital instruments select and simplify the dynamics of Nature and Mind—shaping social behaviours and ecological processes at all levels with a tendency toward control— on the other, their evolving capabilities may allow them to interact constructively with the Processes of the Living World, accompanying their itineraries without dominating them. Among recent scientific contributions, the article "Cybernetics of Action Writing [2] stands out for its development of the notion of Action Writing, highlighting the potential and opportunities for interaction between the Relational Dynamics of autopoietic Living Systems, which express themselves incessantly and cyclically throughout the Biosphere, and the operative capacities of Digital Technological devices. According to the author, such modalities enable the observation and "description-representation" of phenomena pertaining to Living Systems through the lens of Second-Order Cybernetics and Generative Artificial Intelligence in relation to Knowledge production, Creativity, Reflexivity, and transdisciplinary Communication, in ways analogous to natural Processes.

The use and governance of such tools, when practiced directly by participants in an Action Research Process, may prove to be of fundamental importance for Human Ecology, as they offer a potential framework for reference and evaluation of processes aimed at the protection and promotion of Ecosystemic Dynamics in every living environment. The approach proposed by this author —which we share—advances the idea that: "Action-Writing encourages a trade-off between effectiveness and efficiency, similar to the optimization logic of Operations Research. Writers must weigh their goals and contextual constraints in determining the degree of iteration, interactivity, and inclusivity. Ultimately, Action-Writing creates a cybernetically enriched Environment where meaning, shared understanding, and/or knowledge co-creation emerge not from sharing isolated reflection, but from the regulated and recursive interplay of minds, media, and methodologies. "This represents both an advancement and an innovation that could prove highly valuable for large-scale Ecosystems, such as, for example, the Ecosystem of the Metropolitan City of Florence.[3]

In our opinion this article remains the most advanced reference for bridging the approach of Human Ecology with Generative Artificial Intelligence -as evidenced in several passages of this text- his work opening new perspectives within the framework of Second Order Cybernetics and Generative Artificial Intelligence (GAI), enabling interaction with the digital world without succumbing to its domination, and allowing it to be regarded as a partner in Action Research Processes that preserve the characteristics and prerogatives of Living Beings

The future remains open!

Figure 2: And now …. Together in becoming towards new horizons (P. Picasso, 1961)

Our journey through the world—understood in both its real and contemporary digital dimensions— has revealed new epistemological horizons and evolutionary openings. Within this emergent space, the cybernetics of Action Writing, the Communitarian Knowledge, and Social Learning interact within a common epistemic and Methodological Framework grounded entirely in the dynamics and cyclicality characters of the Living World and its continuously unfolding, unpredictable becoming.

While it is true that the world we today inhabit appears to be taking on increasingly destructive traits, potentially threatening its very survival, it is equally true that the dynamics and cycles of Nature and Mind—core components of our Biosphere—continue to generate and regenerate unexpected, self-produced, and self-regulating forms of life and knowledge. These dynamics constitute and reconstitute Ecosystemic realities in which more sustainable and meaningful forms of living are possible. The responsibility of choosing this path remains in our hands.

Acknowledgments

We want to express our gratitude and appreciation to all our colleagues and friends - the members of IIAS with whom we have shared research and outcomes of our experiments for many

[3] See second part of the article [3]

years. We want to thank Dr. Vladimir Fomichov and Dr. Olga Fomichova, who started Cognitonics Research through the interdisciplinary and interactive dialogues at the International Conferences on Cognitonics in Ljubljana, developing these topics at an interdisciplinary, scientific and creative high level. And we want to thank again Margherita Pascucci, an Italian free Philosopher who inspired and supported the epistemological elaborations on which our work was structured.

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Human Ecology Aspects of Ecosystem Revival in Today's World

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Abstract

The subject of this work is exploring the potential and opportunities of various experiential pathways developed through action research processes conducted within diverse living environments across the contemporary world. Our initiatives have been shaped by the ecological characteristics and dimensions of these environments, viewed as integral and authentic components of the Ecosystems of Nature and Mind that constitute the Biosphere. This paper pays a special attention to the case of the Florentine Metropolitan Ecosystem being particularly significant due to the variety and multiplicity of its structuring elements, as well as the network of relationships that can emerge within the growing complexity of the system's action research processes. This ecosystem has been recently recognized by four municipalities in the Florence area as a large-scale Action Research territory. This recognition commits the four municipalities to actively engage the inhabitants of the plains, hills, and both civil and industrial conurbations in a shared Action Research process aimed at the revival of the ecosystem.

Keywords

Living environment, digital world, social knowledge, action writing, action research process, action research territory

1 Introduction

Drawing on the epistemological foundations discussed in the previous article [1], we present here several recent cases of Action Research grounded in the Ecology of Ternary Ecosystems — Human/Society/Environment (Human Ecology) — along with the ongoing case of the Florentine Metropolitan Ecosystem. This enables us to examine how participant-driven dynamics within Action Research processes can evolve in local contexts and foster new relational and learning trajectories across diverse life environments. In summary, this paper addresses four main areas:

-The relevance and suitability of the methodologies and procedures applied, assessed in light of the complexity and specific socio-environmental dimensions involved, with reference to the Living World as conceived within the framework of Human Ecology (Ecology of Nature and Mind);

- The self-assessment tools used by participants, focusing on how they interacted with these tools in relation to their expectations and the diverse skills and capacities that emerged throughout the experiential processes;
- The processes of knowledge co-construction and consolidation, alongside the development of social responsibility—particularly regarding participants' abilities to protect, promote, and manage the living environments they recognized as such;
- The recognition of these participatory experiences as foundational for a potential form of Ecosystemic or Community Governance, capable of engaging with existing political, economic, territorial, cultural, and institutional systems.
- These living environments are thus conceived as newly defined Commons, each governed by its own Statute.

Drawing on the epistemological foundations discussed in the previous article [1], we present here several recent cases of Action Research grounded in the Ecology of Ternary Ecosystems — Human/Society/Environment (Human Ecology) — along with the ongoing case of the Florentine Metropolitan Ecosystem. This enables us to examine how participant-driven dynamics within Action Research processes can evolve in local contexts and foster new relational and learning trajectories across diverse life environments.

In this regard, the case of the Florentine Metropolitan Ecosystem is particularly significant due to the variety and multiplicity of its structuring elements, as well as the network of relationships that can emerge within the growing complexity of the system's Action Research processes.

This Ecosystem has been recently recognized by four municipalities in the Florence area as a large-scale Action Research territory.

This recognition commits the four municipalities to actively engage the inhabitants of the plains, hills, and both civil and industrial conurbations in a shared Action Research process aimed at the revival of the ecosystem. This process unfolds through complex dynamics in which living contexts and digital domains intersect and co-evolve toward the Metropolitan Ecosystem.

This article and the article [1] describe our project aimed at ecosystem revival in today's world. The section 2 of the article [1] sets forth epistemological foundations of our project. It presents a concise general epistemological framework within

which the ecosystems of the Biosphere are structured and sustained over time. The section 3 of the paper [1] relates to the new digital revolution. The concept of Action Writing, within Second-Order Cybernetics, reveals how Generative Artificial Intelligence (AI) can interact with the relational dynamics of living systems to support knowledge, creativity, and reflexivity—mirroring natural processes and offering new tools for Human Ecology.

The Section 2 of the present article outlines human ecology practices in Italy and Europe (1990s–2020s) developed through context-specific Action Research approaches that reconnected local environments—urban, rural, and natural—to the dynamic principles of the Biosphere. The Section 3 of the present article discusses an ongoing Action Research initiative for the ecological renewal of the Florence–Prato–Pistoia metropolitan area, where Human Ecology and advanced digital technologies could participate in the co-evolution of an emerging intermunicipal ecosystems. We examine several concrete cases previously implemented, as well as the evolving case of the Metropolitan Ecosystem, which remains open to new horizons of Participatory Solidarity-Based Action Research.

2 Experiences in Human Ecology

Here a summary presentation of our Action Research experiences in the context of Human Ecology within different local ecosystem conditions.

With regard to the epistemological framework just described, we would first like to express the motivations that have inspired and stimulated all our work and which could be defined in terms of relational and emotional participation in the different conditions we have encountered along the way.

All this has led us to explore many paths and investigate many realities in which, at every level, we could recognize social conditions ripe for resisting the threat of dominant globalized thinking and its financialisation, and for reacting by recreating new Ecosystemic realities starting from their reference and belonging environments.

We thus adopted the Ecosystemic approach as a reference point on which to structure and develop specific Action Research processes to be activated in relation to the contemporary issues that gradually emerged.

This orientation led us to move beyond conventional design and planning approaches, adopting instead Action Research as a comprehensive methodology—applied across a spectrum of contexts ranging from micro-level socio-environmental settings to broader urban, landscape, and ecological systems. In each of these, we engaged directly with the complexity of local dynamics, working in close collaboration with communities and stakeholders.

Throughout these initiatives, we promoted a wide array of Action Research Processes, each specifically tailored to the unique characteristics of the context in which it was implemented. These Processes enabled the co--construction of new conditions and project outcomes, emerging organically through the participatory pathways activated.

The research processes followed cyclical, iterative phases, beginning with the analysis of social perception (at the group or community level) and progressing toward the consolidation of shared Social Knowledge. These phases were oriented toward fostering participant creativity and developing their capacity for ecosystem responsibility, including protection, promotion, and sustainable management—conceived as forms of local Governance within their lived environments.

In parallel, we elaborated and refined an organizational structure to support and coordinate the research processes. This structure was designed to facilitate relational and interactive dynamics among participants, fostering an environment characterized by mutual learning, cooperation, and shared responsibility.

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Within this framework, every opportunity for encounter and shared experience—whether choral, group-based, or community-based.

2.1 Some Examples

We here recall a selection of representative examples drawn from numerous Action Research projects developed over the decades—from the 1990s to the present—undertaken in parallel with the rapid expansion of globalization and the advent of the Digital revolution.

In all these experiences, learning and socially situated knowledge played a central and structuring role. Even in the less successful or incomplete cases, the processes remain embedded within the participating groups, serving as a latent stimulus for the reactivation and renewal of further Ecosystemic projects. Illustrative cases include:

The school in a Ship, La Spezia Liguria Region 2006: scholar Group of Elementary Scholar Group and teacher continuing up to current times.

A school-based workshop dedicated to discovering the City, its Gulf, and its history through the lens of its relationship with citizens, past testimonies preserved in documents and artworks—all explored and understood by

pupils engaged in a journey of discovery of their living environment, the people they encountered, and the opportunities to open the school to the City and the Gulf. This was achieved through a "School of the Sea" project, housed in a ship-library: a floating laboratory for the life of the City and the Sea. A ship imagined, desired, and shaped by the pupils themselves, based on their curiosities and aspirations—committed to constructing a new model of schooling to be presented to the City and its citizens as a tangible reality. The aim: to promote a renewed school shaped by the care and engagement of participants from the school workshop, families, and local Public Administrators.

Figure 1a: "The Group also designed a children's restaurant in front of the ship-school, complete with chefs, tables, and dishes to be enjoyed together during study breaks".

Figure 1b: The Group Presents the School Ship

Figure 1c: Working in the classroom

A school-based workshop dedicated to discovering the City, its Gulf, and its history through the lens of its relationship with citizens, past testimonies preserved in documents and artworks—all explored and understood by pupils engaged in a journey of discovery of their living environment, the people they encountered, and the opportunities to open the school to

River Landscape Contract – a small Fluvial environment of Panaro River Modena, Emilia Region 2009

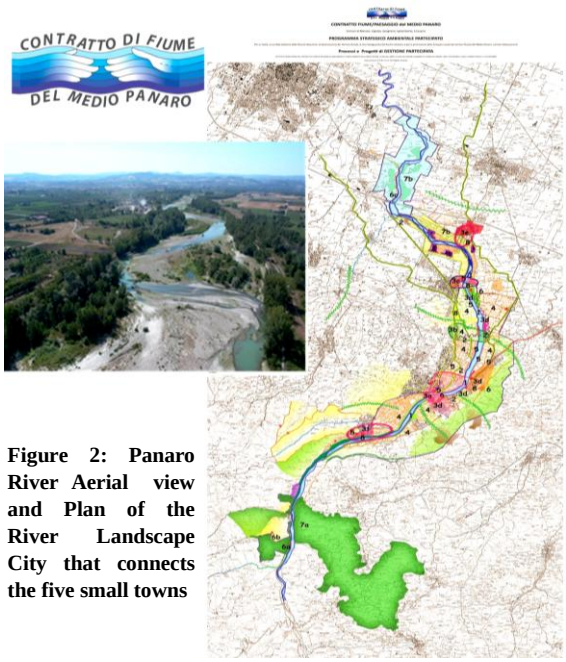

Figure 2: Panaro River Aerial view and Plan of the River Landscape City that connects the five small towns

The Middle Panaro River: A micro-fluvial environment bordered by five small Urban settlements of ancient origin, featuring a riverbank rich in Pliocene fossil deposits, a once-thriving riparian forest now significantly degraded, high-quality orchards on fluvial terraces, and a network of local Museums housing important archaeological artifacts. This landscape is currently threatened by real estate speculation, energy production plants, inappropriate technological infrastructure, aggregate extraction, and the fragmentation of its ecological mosaic.

Citizen Groups are engaged in ongoing conflicts with their own Public Administrations, as the River has become increasingly excluded from the everyday life of the surrounding Towns. Through collaborative efforts, we have rediscovered the River's significant cultural and ecological value and identified new possibilities for restoring the relationship between the inhabitants and the river. This has led to the development of a renewed form of interaction between the River and the small riverside Towns, founded on Participatory Governance and formalized through a *River/City-Landscape Contract.*

"**Landscape-City" Projects** - Capannori – Lucca, north Tuscany 2015

Fig.3 Capannori is a large rural and civic area with historic villages and scenic hills, which have remained well preserved, while the plain has been increasingly overtaken by factories, new housing, and heavy traffic infrastructure

From a Fragmented Periphery to the Rediscovery of Territorial Qualities it is possible to envision a new model of integrated settlement, governed by its own inhabitants: the *City/Landscape

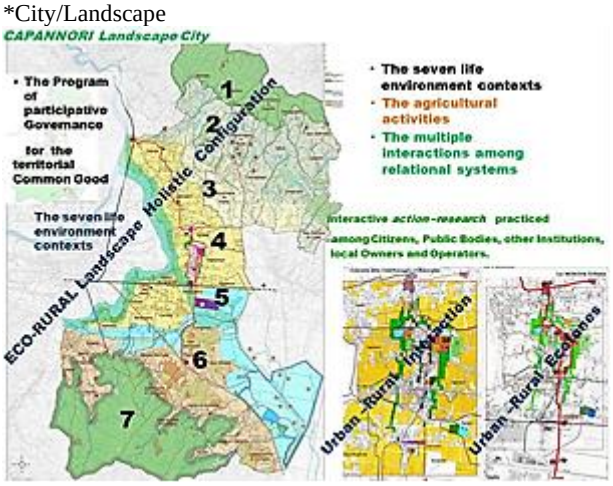

Figure 2: The Landscape City is Reborn from the Fragments of the Peripheries between Hills plain and Waters a new configuration of Landscape City, rural and urban at the same time, where complex social dynamics interact to turn the present situation into a new condition, rural and urban at the same time, the contemporary rurality and the urban activities co-exist and create a new quality of life within a new evolutive Bioregion

Rural Med European Project 10 Italian and 5 European Mediterranean Partners (2004-2008) The Landscapes of the Contemporary Rurality

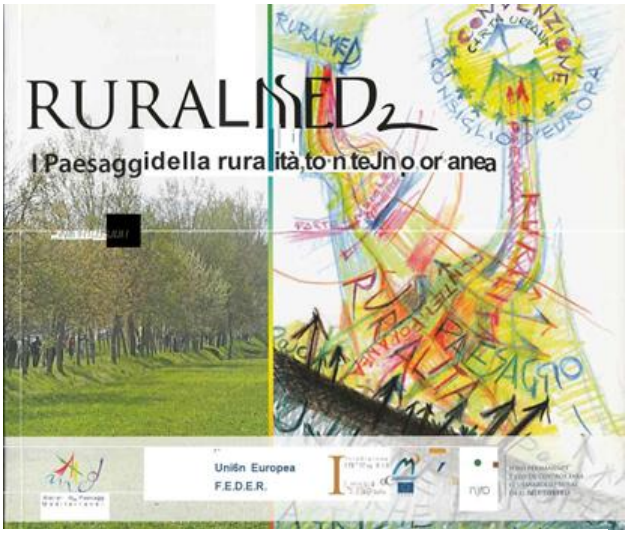

Figure 3: RuralMed: An Experimental Action Research Model for Mediterranean Europe

This model has emerged from a self-managed European research initiative of a Group of Local Partners in Tuscany, led by Institutions and Communities committed to re-inhabiting and re-valuing their living environments within the framework of a renewed European Rurality. Throughout the European Project, we developed new rurality initiatives in collaboration with various Tuscan partners, identifying within the complex economic, cultural, and agricultural conditions of hillside farming renewed productive practices and rural lifestyles, embodied in what we have termed the 'landscapes of contemporary rurality'."[1]

3 The Metropolitan-Scale Ecosystem in the context of the Florence-Prato-Pistoia Basin

We will present the case of the Alliance for the Metropolitan Ecosystem, which includes the four municipalities of Sesto, Calenzano, Campi Bisenzio, and Carmignano, and GRASP the Future as a bridge between local Administrations and the inhabitants of their territories. This Alliance aims to weave Relationships, reconstruct environmental cycles, and consolidate and generate new forms of adequate socialkKnowledge to foster the reclamation of Living Environments and the revival of local and Metropolitan Ecosystems. Numerous Action Research Processes based on the epistemological criteria and principles illustrated above have been activated and will interact with each other through cyclical and relational dynamics that will develop throughout local experiences and thematic explorations. The complexity and scale of the human and environmental conditions within this context have driven us to seek new pathways and innovative strategies to sustainably resist imminent threats and to structure a community-based management of living environments aligned with the evolutionary dynamics of the new Human/Society/Environment Ecosystem. Here, we limit ourselves to presenting the Alliance and its Protocol, which have been developed and recognized as the result of a multi-year collaborative effort between the Parties and Local Society. This Protocol is intended to become the Operational Framework for Action Research in the territory, aiming to establish a Pact for the revival of the Metropolitan Ecosystem

" The Municipalities of Calenzano, Campi Bisenzio, Carmignano and Sesto Fiorentino and the no profit Association 'GRASP the future Alterpiana' intend to promote a stable Alliance for the Metropolitan Ecosystem as a Common Good and for its ecological/.evolutionary conversion in the humanity/environment relationship through the signing of a specific Memorandum Of Understanding (Statute).

The Alliance will bring together Public Bodies, Structures and Entities active in the Citizenship Community (associations, schools, economic operators, etc.), scientific and experiential knowledge structures, all equally and progressively involved in the construction of this Alliance and in the process of Action Research that originates from it,

[1] All these projects have been published by European Council with the title *RuralMed I paesaggi delle Ruralità contemporanea , 2008*

in the construction of the Metropolitan Ecosystem and in the evolution of a renewed contemporary Living Environment recognised as a Common Good".

With the signing of the Protocol, the Participatory Process, which will lead us to form the Pact for the Metropolitan Ecosystem, has begun. The four Municipalities involved and some Communities already active in the area have taken on the promotion of the Metropolitan Ecosystem as the foundation and Reference Point for all their participatory activities in the area, in order to reconnect the nature and history of the places to the contemporary condition, as stated in the Memorandum of Understanding (Statute) for the Promotion and Protection of the Metropolitan Ecosystem, which commits the Allies.

"To establish a permanent partnership for the care and revitalization of the Metropolitan Ecosystem (Residents/Municipalities Alliance For The Metropolitan Ecosystem), Promoting A Process Of Recognition and reconstruction of the Ecosystem through collaboration among public institutions, non-profit associations, social economy operators, private citizens, scientific bodies, and experiential knowledge entities, all equally and progressively engaged in the revitalization and construction of the Metropolitan Ecosystem as a Common Good. This will be realized through:

- the sharing of actions and interventions in the territory addressing Primary Themes (air, water, soil, energy, food, waste), which form the basis of their history and of the Metropolitan Ecosystem, recognized by the parties as a common good;

- the in-depth study of the structure and nature of Ecosystems as indicated by the European Nature Restoration Law, and of the Metropolitan Ecosystem as a whole, in order to derive the appropriate consequences to ensure their protection, promotion, and revitalization;

- the experimentation with concrete forms of research and action by all stakeholders interested in these objectives concerning the Living Environment/Ecosystem as a Common Good;

- the promotion of dedicated informational campaigns, activities of public information, education, and awareness-raising regarding the Metropolitan Ecosystem, as well as the shared enhancement of Common Goods, including through appropriate Representations and Configurations, ultimately leading to the establishment of a Pact for the Ecosystem."

These commitments are already being translated into corresponding Action Research Processes developed by Working Groups formed on the basis of participants' desires, skills, availability, and active capacities, as well as the diverse proposals put forward by the participants.

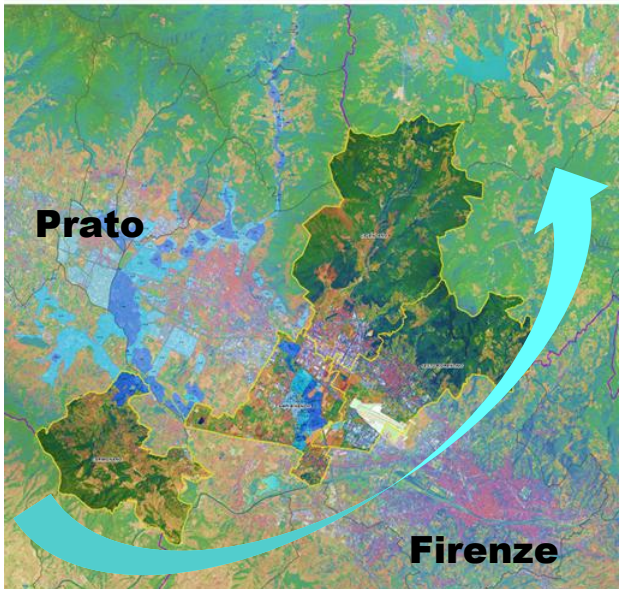

Figure 4: Metropolitan Ecosystem between Firenze and Prato, the main inter- urban structures of the Florentine conurbation

In this context, the Working Groups operate on various local fronts and relate to a Coordinating Structure dedicated to Overarching Thematic Areas (Water, Agriculture, Technologies, Food, Waste, Energy, Information, Communication. Concurrently, different Action Research processes are activated, cyclically self-assessed and periodically reported to the Thematic Coordinating Body, where Social Learning and Community Participation will find the references on which the Ecosystem will be progressively structured. This involves Working at multiple levels (Primary local Action Research processes and Second-Order general thematic ones), while maintaining open, from the outset, all relationships and interactions between Groups and Coordination, and between all these and the domains of the evolving Metropolitan Ecosystem.

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The Objectives, Structure, and Experience of an Online Course "Emotional-Imaginative Personality Development"*

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Abstract

The paper describes the principal original features of an online course "Emotional-imaginative personality development" (two semesters). The course was launched in Spring 2020 due to the announced self-isolation caused by the coronavirus pandemic. The course is underpinned by the technology of emotional-imaginative teaching with the focus on up-bringing developed by the authors of the present paper. It is a new realization of the student-self oriented learning model introduced in several previous works of the authors. The accumulated experience shows that the online format opens a number of precious prospects for personality development of young children (elementary school) and adolescents. The present paper pays a particular attention to the realized methods of developing emotional intelligence, values system, creativity, analytical thinking, metaphoric reasoning, and the attitude to the nature as to a communication partner. The paper enriches the psychology of supporting emotional intelligence by means of introducing the notion of emotional divergence.

Keywords

Online education, personality development, emotional intelligence, creativity, emotional divergence, cognitive painting, values system, soft skills, technology of emotional-imaginative teaching with the focus on up-bringing, student-self oriented learning model, metaphoric reasoning

1 Introduction

The paper [1] presented at the international conference Cognit-2022 introduced a broadly applicable method of constructing a positive cognitive-emotional space for young children and adolescents under conditions of the COVID-19 pandemic. This method is called *the Method of Cognitive Painting (MCP)*. It may be interpreted as a realization of anti-COVID-19 cognitive resistance, as an original conceptual tool helping to overcome strong moral fatigue and depression caused by self-isolation and the lack of many usual activities due to the coronavirus pandemic.

The principal objective of the present paper is to describe the cognitive preconditions of MCP successful realization. MCP is a result obtained while realizing our original online course "Emotional-Imaginative Personality Development". This course was successfully realized in March – May and October – December 2020 in the Centre for Social Competences being a structured division of the big educational complex "Sparrow Hills", Moscow, Russia. The age of the learners – from 6 to 18 years.

The course objectives are the development, in particular, of:

- the discoverer ability to see unmotivated unity of things;
- the conceptual world's picture and value systems of the learners;
- emotional sharp-sight;
- the ability to decode metaphors and metaphorically represent the own vision of a situation or of a problem in order to brighter express the meaning of an utterance.

During the last decade it has been broadly realized that education in a knowledge society (or smart society) is to pay particular attention to supporting and developing in the learners the significant, independent skills called soft skills [2, 3] or transversal skills [4, 5], including analytical and critical thinking, creativity, out-of-the-box thinking, and thinking and acting in terms of the public good.

For achieving the course objectives, we develop:

- emotional intelligence and creativity;
- analytical thinking, critical thinking, and out-of-the-box-thinking;
- associative abilities, especially of metaphoric thinking;

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- the ability to find the solutions in difficult situations;
- citizen feeling.

The described online course is underpinned by our technology of emotional-imaginative teaching with the focus on up-bringing (the EIT-technology), it belongs to the constructive core of cognitonics, or the science about the human being in the digital world [6-27].

Course Organization

Distant educational interaction is realized by means of e-mail two times per week. Firstly (usually on Monday), a methodical material (called a lecture) is distributed among the parents and children. Simultaneously with methodical materials, the first home assignment for a week is sent via e-mail. The second assignment is usually sent on Thursday of the same week.

The adults being responsible for concrete groups of the learners collect the home assignments prepared by the group and submit them via e-mail to the teacher.

The asynchronous principle of teaching/learning (APTL) was selected by us for the realization of the considered educational online course. This principle proved to be very effective in the leading western distance educational programs realized in early 2000s. APTL proceeds from the existence of a time distance between communicative acts fulfilled by the lecturer (teacher) and every learner. The very important advantage in our case is that the teacher selects a convenient time for posting teaching/learning materials, comments, and the answers to the questions of the learners. On the other hand, the parents of children (or the grandmothers and grandfathers) choose time when, firstly, they are free from office work, and, secondly, when it is most comfortable for children to learn (in particular, when they are not tired and not overexcited).

Our online course received unexpected evidence of its effectiveness as concerns the development of creativity and emotional intelligence of the learners. This evidence is the creation by the learners (due to their initiative) of two video films. The first one represents a distant literature evening with children and adolescents at the age from 8 to 13 years; the participants recited the poems by Alexander Pushkin, William Shakespeare, Rudyard Kipling, Boris Pasternak and others.

The second video film represents a Big Spring Ball in the form of dances' videorecords with a pair of dancers or one dancer. The dancers are the adolescents at the age from 16 to 18 years and the alumni of educational program "Culture, Ecology, and English language". Over 20 video records are unified by means of the waltz No. 2 from "Jazz Suit" by Dmitry Shostakovich.

2 A new method of forming the cognitive subspace of moral values and social responsibility

Our online course suggests the following new objectives for influencing the development of the personality in modern knowledge society.

It is necessary to start earlier than it is traditionally done to acquaint children with the very complex system of social agreements. Since this system is based on numerous symbols, the scholars need to pay more attention to developing symbolic information processing skills of young children and teenagers. In addition, it is necessary to early acquaint children with the idea that different people may have considerably different inner world's pictures (i.e., conceptual systems), and it is very important to take this into account while interacting with people. It is important to explain to young children and teenagers that practically every person has various connections with many other people. That is why a suffer of a classmate, etc., in fact, causes the suffer of many other people: the mother, father, the brothers, sisters, the grandmother, grandfather, etc.

The central idea of our approach is as follows. Rather often a child tries to distinguish himself/herself among his/her peers by means of emulating a bad pattern of the adults' behavior: smoking, aggressiveness, following the formula "Might is right", etc. This applies not only to the teenagers but also to children at the age of 10 – 11. It is important to underline that the bad patterns of the adults' behavior (drinking, etc.) most often are the consequence of misfortune, despair. Normally, children have no despair, they simply emulate the adults.

As a result of employing the stated method at lessons under the framework of the EIT-technology, the child acquires (by the end of the second year of studies, at the age of 6 – 7 years) the possibility to distinguish himself/herself not by means of a deviant behavior but with the help of mature thoughts and thoughtful behavior.

One of the important preconditions of employing our method during the second year of studies is the well developed metaphoric thinking. The scheme of creating this precondition is as follows:

Reading and discussing complex texts in English as a foreign language (FL) at the age of 5 –6

→ mastering a rich sublanguage of FL for expressing the beauty of nature and the feelings evoked by nature

→ development of figurative reasoning + development of the awareness of the social role of Natural Language

→ understanding poetical metaphors

→ creating metaphors

→ understanding the symbolic language of painting

→ development of the ability of decoding the messages conveyed by the masterpieces

→ realization of the "Thought-Producing Self" (see [6, 7, 10, 12, 13]) and the improvement of the feeling that a person is a link in the long chain of previous and future generations.

3 Formation of a New Level of Ecological Consciousness

The rationale for the ideas stated below is that the broad prospects of developing the personality of children and adolescents are not entirely understood, not used by modern education as a whole, but are opened by systematic (starting in early childhood) establishment of a correspondence between the situations observed in nature and everyday situations.

Today children throughout the world study nature from the standpoints of botany, biology, geography, chemistry, and physics. Our accumulated experience shows that this approach is too narrow and does not include a complete understanding of nature, of grasping the whole spectrum of knowledge about the

world and about the behavior of a person in the world of people, a philosophy encoded in the phenomena of nature.

Outstanding poets, writers, and painters give numerous examples of decoding deep meanings in nature's phenomena, expressing these deep meanings by means of verbal and visual images comprehensibl e convinced that it is possible and necessary to use the lessons of literature, poetry, and the arts as a possibility of a dialogue between people and nature, while searching for the answers to acute questions during the period of the maturation of one's personality.

Conducting a dialogue of this kind creates cognitive preconditions of forming a principally new level of ecological consciousness when nature becomes a permanent partner able to listen and to give answers. This is the true meaning of the broadly known phrase "It is necessary to be able to read the book of nature."

The most important result of forming this new level of ecological consciousness is the creation of strong inner restrictions concerning the human destruction of nature: one cannot destroy something in one's consciousness.

Analyzing the essays being the fulfilled home assignments (distributed via e-mail), we concluded that the idea of nature-oriented behavior was broadly perceived by young children and teenagers as part of their conceptual world's picture.

Example 1 (from Alexandra E.). *"Let's consider the emergence of the leaves on the trees in spring and the shedding of leaves in autumn. I selected this phenomenon, because it is like the situation when people emerge in our life: some time they are close to you and then, in autumn, their interest in you fades, your relations are fading, and such people lose the connection with you, just as the leaves during the shedding. Only those people stay near you, who interlock with the tree and are fading together with it".*

Example 2 (from Ilya K.). *"A leaf from a tree fell in the water of a river, the river grasped it and carried away. Maybe, it will stop on the beach of the river, but maybe it will take on weight and sink. The same situation can be observed in life. If a person has no own opinion, that person will "flow" across life, achieving nothing. It is necessary to have one's own opinion."*

Taking the above essays into account, we suggest a new fundamental approach to upbringing of young children and adolescents (considering that the upbringing is directed socialization): to systematically establish the parallels between the phenomenon of nature and social agreements, life situations.

4 A new approach to improving out of the box thinking and the ability of multi-facet world's viewing

The present paper continues the line of the paper [26] as concerns presenting a new look at little "C" and big "C" creativity. Big "C" creativity (BCC) [28] is regarded in connection with the creative ability of outstanding scientists, musicians, painters, writers, poets [27]. Smart society demands little "C" creativity (LCC). It reveals the smart society's necessity of creative thinking [30] and creative approach to solving the every-day tasks. LCC improves problem solving skill, which is one of most important skills.

BCC is defined by two main characteristics. It is regarded as original and highly significant creative activity for big groups of people. Creativity of children (LCC) usually is subjective and is defined by their previous knowledge. The main characteristics of LCC is their imagination [31]. Smart society demands the necessity of supporting and improving LCC in order to create the preconditions for increasing the proportion of the specialists in significant application domains who possess BCC.

In order to solve that problem and achieve the significant results in increasing LCC in order to have BCC in future, we have found the way how to combine as early as possible LCC and BCC in the process of realizing the Thought-Producing Self of the child.

The first step suggests the understanding by the children of the significance of thought. It helps to return the notion "value of thought" to the world's conceptual picture of the school children.

The second step suggests the awareness of the school children of the fact that their ideas, metaphors, way of viewing nature, communicative situations, the pictures, etc. may be highly significant for relatively big groups of people in case of sharing their ideas with the others. The reason is that they have given a sophisticated look at something and have revealed an example of serendipity (the ability to make pleasant and unexpected discoveries entirely by chance). It happens due to their natural ability to see out of the way things in usual things and usual things in out of the way things. It might be thought provoking for grown-up people.

Example (one of the examples of nature inspired behaviour). The crown is sitting on the twig. The crown is heavy and big, the twig is thin. But the crown is no nervous. It is not afraid of the fact that the twig may break, because the bird doesn't think about the twig, it trusts its swings (Anne, a seven year girl).

Example. Nine year old children are taught the language of painting. Then they are asked to paint with the help of the words (natural language) a portrait of their mother and describe what they have depicted. One of the nine year old boys described his mother, sitting in an arm chair in the garden in spring. He said that she was blond and she had a long plaid. In fact, his mother had short black hair. To the question why he had said that his mother was blond he answered that he had depicted her inner world, the essence of her personality in order to create the right image of hers, because all kind princesses in Russian fairy-tales are fair-haired.

The third step is to make children aware of the beauty and wisdom they have discovered, because in most cases they do it without a second thought, intuitively. It just donned upon them. They need encouragement to continue mental and spiritual work on that level. Their efforts and their inspiration should be discussed and appreciated by the community.

Example. "To dig out of the ground all its treasures, whether it is the goal of life?" (Angelina, 14 years old).

Example. "Do we love the Volga river only because it provides us with fish?" (Marina, 15 years old).

Example. "All good deeds are reflected on the palm of the Time" (Mary, 15 years old).

Example. "We are not planting the flowers, we are introducing beauty into the world" (Anton, 15 years old).

The fourth step is to show the examples of BCC revealing the same idea to make children believe that the value of thought doesn't depend on age and experience, but the age and experience help us to penetrate the very essence of the thought, to comprehend it.

Example (a fragment from a poem by the world known poet Boris Pasternak).

"In everything I seek to grasp

the fundamental:

The daily choice, the daily task,

The sentimental

... And puzzling out the wave of fate,

Events observer,

To live, feel, love, and meditate

And to discover".

The awareness of the value of thought, the ability to see many aspects of reality, creativity as a thought provoking process being able to transfigure the world lead to improving out of the box thinking, problem solving skills and reveal nature inspired behavior.

5 Emotional Divergence as the Brocken Pillar of Successful Personal Communication

The educational process underpinned by the student-self oriented learning model [8-10, 12] includes the attraction of the students' attention to one significant aspect of emotional intelligence. The emotions evoked by personal communication might lead to *emotional divergence.* Let's consider the meaning of this scientific notion introduced in the present paper. Let's imagine that a communicative situation is based on common life experience of two communication partners, reveals similar level of emotions experienced by them and, moreover, these emotions are defined by the similar words. However, the principal thing in the considered situation is that similar emotions and similar words are caused by different circumstances.

For example, in the story by George MacDonald "The Light Princess" there is a fragment when the princess (who was deprived of her gravity) could feel herself comfortable only in the lake while swimming. She couldn't fall in the lake from the rock by herself, because she was lack of gravity. She hadn't had an experience of the kind. But one day the prince caught her up in his arms and sprang with her from the rock. They both were beside themselves with joy.

Then there was a dialogue of the kind. "How do you like falling in?" said the prince. "Is that what you call falling in? It seemed to me like being up", rejoined she. "My feeling was certainly one of elevation too", the prince conceded.

"How do you like falling in?" said the princess. "Beyond everything", answered he, "for I have fallen in love with the only perfect creature I ever saw. Don't you like falling in?" said the prince.

"It is the most delightful fun I ever had in my life… At all events, as we have fallen in, let us have swim together". "With all my heart", responded the prince.

The communication partners experienced similar emotions, even they agreed that it was not "falling in" but "going up", but the cause of that strong emotion was different. The prince was in love with the princess, and the princess was in love with the lake. The both fall in L…This situation should be clear to the students, since it is a complicated one and may cause various difficulties, because touches their Self.

The students are asked to give their own examples of emotional misunderstanding. Likely, the most interesting example is given by the world known song "Save your kisses for me" (the British pop group "Brotherhood of man" won the 1976 Eurovision Song Contest with it), its authors are Tony Hiller, Lee Sheriden, Martin Lee:

"Though it hurts to go away it's impossible to stay
But there's one thing I must say before I go
I love you (I love you) you know
I'll be thinking of you in most everything I do…

Don't you dare me to stay,

'cause you know you've got to save

Your kisses for me, save all your kisses for me … even though you're only three?"

The audience is sure that the song is about two lovers, but it turned out to be about the father and a three-year-old daughter.

This situation proves the importance of controlling one's emotions in order to listen to the communication partner intently to better understand him/her and not to give way to your emotions, the importance of not letting yourself to be carried away by your emotions.

This educational approach explaining the students the importance of considering the emotions will allow them later to avoid the conflicts, misunderstanding, and disappointment. In some cases, it will prevent them from being downhearted.

6 Significance of Higher Personality Development

Knowledge society and digital space in general cause the endless processes of challenges and answers. The digital space is created by the most gifted people, who dare to create another world with much more opportunities for humans. On the other hand, that intellectual challenge and application of information and communication technologies in all spheres of human activity and even, in some cases, substitution by robots or androids reveal new demands to the Personality. In order to correspond to the created digital reality, we need to make the focus of education (face-to-face and e-learning) on the higher personality development in order to be successful in smart society [26]. It means that the personality is able to regard thought as a value, understand (not only know which is equal to having information) and be thrilled by the processes of thinking, being able to dare and to take responsibility for it. It suggests that he/she is a socially and intellectually mature person and has improved emotional intelligence and is a spiritually mature person.

Higher personality development includes the ability to put unpredictable questions (out of the box thinking), to be ready to make a breakthrough on any level, strong interest in cognition (self-cognition, meta-cognition), nature inspired behavior, sociability, sense of belonging, awareness of the necessity to be grateful to other people [26].

Modern reality teaches us that modern technological solutions which underpin the creation of new products are hidden. The companies don't want us to get the students acquainted with those technical solutions. They just teach us how to use their products (Google Educational Platform, for example). That is why the focus of education must be shifted to higher personality development, and the main object is to train

students to think and discover TWO WORLDS: the world inside and the world outside (the second is easier).

In this case we'll have the equilibrium (or balance) between the created digital space and the humans with higher personality development being able to appreciate and correctly use the new digital reality. It will be an initial stage for a new level of digital space development, much more humanized one, because it would be started up by the gifted humans reached the level of higher personality development and aimed at humans with higher personality development.

7 Conclusion

The online course "Emotional-imaginative personality development" (two semesters) is underpinned by many-year experience of realizing *the technology of emotional-imaginative teaching with the focus on up-bringing* developed by the authors of the present paper. The used technical means are e-mail (the distribution of the lectures and home assignments, the receipt of the fulfilled home assignments) and multimedia tools for preparing home assignments. The creation of an online course was caused by the self-isolation announced in March 2020 by the maire of Moscow due to the coronavirus pandemic.

The accumulated experience shows that the online format opens a number of precious prospects for personality development of young children (elementary school) and adolescents. The present paper pays a particular attention to the realized methods of supporting and developing emotional intelligence, values system, creativity, analytical thinking, metaphoric reasoning, and the attitude to the nature as to a communication partner. The paper enriches the psychology of supporting emotional intelligence by means of introducing the notion of *emotional divergence*.

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Understanding the Reality: Existential News Reading in the Algorithmic World

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Abstract

Every day, we encounter countless news information filled with facts, data. These elements interconnect to form what appears to be an objective representation of reality. Yet, this world of news is increasingly shaped by algorithms, and the "facts" presented do not always reflect the truth. In this paper, this issue is explored through the true story of the 2024 political turmoil in Korea.

Key words

News information, 2024 martial law in Korea, existentialism, reality, algorithmic news reading

1 Misreading the situation

On December 3, 2024, a significant and absurd event unfolded in South Korea: then-President Yoon declared martial law and imposed restrictions on political activities. This action appeared to signal a regression to the old authoritarian era of the 1970s, raising deep concerns about the future of South Korean democracy.

However, the democratic will of the citizenry ultimately prevailed. In the face of growing public resistance and constitutional challenges, President Yoon was impeached.

Subsequent reports revealed that Yoon, who had relied on shamanistic fortune-telling for many years, had become increasingly isolated within his office, engrossed in YouTube videos produced by his right-wing supporters [1]. These videos reinforced his belief that the general public supported him and that only a small number of opposition groups criticized him and his wife. This misperception likely contributed to his conviction that declaring martial law would consolidate his and his party's control over the political landscape.

The events in this case reveal how distorted perceptions of reality can significantly influence political decision-making and the resulting consequences.

A contemporary technical algorithm added by ancient spiritual shamanism contributed to reproduce a modern political despotism.

Yoon had made a decision based upon his world reality, but he didn't know it was a false or fake reality. He was said to enjoy drinking alcohol, and then the president was drunk on algorithm as well as alcoholism.

2 The Meaning of Reading News

One comes to know the world through the news. In the act of reading, the reader extracts meaning from the presented content. It is through the news that we encounter the world. But more than that, it is through the news that we are called to interpret, to judge, and to choose. Journalism, then, is not merely a social institution—it is an existential medium: a space where being, knowing, and acting converge.

To read the world is also to respond to it. Interpretation carries with it a responsibility—a call not only to understand, but to care.

Through the news, we do not merely consume facts; we enter into relation with the world. And in that relation, we become accountable.

Concern is not sentimentality—it is a participation. To engage with the world through news is to enact one's role as a social subject. Every act of concern—whether reflection, critique, or action—is a moment of existential participation in a shared world.

Intellectual concern inevitably leads to personal value judgment. Even the attempt to merely observe and abstain from judgment is itself a form of judgment. If one tries to suppress this engagement and attend only to supposed objective facts, one negates a vital dimension of human beings: the capacity for evaluative response.

Thus, reading the news is not merely an act of passive reception; it is an existential act. It discloses the reader's stance toward the world and affirms their participation in it. Therefore, facts need to reflect reality accurately.

President Yoon, who often watched YouTube, was similar to President Kennedy, who began his daily work by reading various kinds of news articles in the morning. But their concerns seem to be quite different from each other, personally as well as technologically.

3 Algorithmic world

3.1 The world

Heidegger conceptualized the "world" (Welt) not merely as a physical space but as the meaningful horizon within which human existence unfolds. In this framework, the world constitutes a network of significance—a structure of meaning rather than a collection of material facts. News is a substance that corresponds to this meaningful horizon. News media, as cultural artifacts, function as fragments of this structure, mapping relations between people, events, and values.

In the context of cyberspace, however, the idea of a singular, shared world fractures. Multiple "worlds" emerge, each shaped by individual concern and algorithmically curated content. In this sense, the world becomes not an objective reality but a

subjective virtuality—an environment tailored to personal interests, yet mistaken for neutral truth. Just as the physical world is divided into nations and territories, the digital world is partitioned into ideological and informational enclaves.

A human being in the 21st century lives in a dual world: the digital world and the physical world. Since the introduction of the digital network, we have believed that we live in a globalized, unified cyberspace, although we live in a divided physical world. But it seems that we live in another divided world of artificial space. Yoon lived in a unique world, which was remade algorithmically to his liking. Out of the digital space, he affected the physical world. He lived in a physically small world, surrounded by his high school alumni, and in a digitally narrow world of algorithmic information. But his decision seriously influenced society as a whole. It was an invasion of digital power into the physical world.

3.2 Algorithmic Platform

Cyberspace is often constructed by the algorithmic platform. Algorithmic manipulation plays a central role in the digital world's structure. The world of factual reporting is filtered, recomposed, and personalized, producing a sense of coherence aligned with the user's preexisting worldview. Individuals inhabit these algorithmically generated "subjective worlds," believing them to be objective. The result is a technologically facilitated subjectivism—one sees what one wants to see, and this filtered perception becomes one's experiential reality.

As the quantity of news expands, so too does the reach of these subjective worlds, while the shared space of objective discourse appears to diminish. This represents a growing tension between subjectivity and objectivity in the digital sphere.

This dynamic was exemplified in the case of President Yoon, who reportedly immersed himself in a personalized YouTube environment shaped by algorithmic recommendation. There, he found content that reinforced his concerns and worldview, ultimately leading to political decisions grounded not in a shared reality, but in a fragmented, self-reinforcing digital world.

3.3 The Necessity of Algorithmic News Production

There are several factors necessitating news automation, including the emergence of algorithmic news services.

(1) Economic reason

Once implemented, automated systems tend to have low upkeep expenses, allowing organizations to cut labor costs, minimize operational spending, and sustain productivity gains over time [4].

In the field of news production, too, automation reduces costs and increases productivity by cutting personnel expenses and decreasing operational costs, as once an automated system is established, the maintenance cost is low.

And economic efficiency is another advantage. Enhancing productivity increases output. In other words, this enables the production of more articles within the same amount of time. Automation of repetitive tasks can quickly process structured information.

(2) Market strategy

Automation is swiftly adapted to changing market and audience needs. Market logic is hidden in the behavior of gaining competitive advantage, responding to consumer demand, and providing personalized content.

News suppliers try to gain an advantage in the competition for speed and accuracy among platforms. Readers want to consume news more quickly. Demand for real-time delivery increases. Artificial Intelligence (AI) can provide user-tailored news content through personalization and customization.

As digital platforms compete to publish faster and more accurately, the audience's expectation for immediacy drives investment in AI, enabling news providers to customize and personalize content delivery [6].

(3) Technological reason

Utilizing technological advances to accelerate news production and delivery with editorial speed became possible. Automated article writing instantly generates article drafts based on structured data. Headline suggestions and automatic image insertion enhance efficiency in content creation. Breaking news processing enables rapid delivery at speeds difficult for humans to match.

Advances in technology now allow newsrooms to accelerate production and delivery without compromising editorial standards, leveraging automation to process and publish content at unprecedented speeds [3].

For these reasons, algorithmic news supply through news automation will likely continue to expand, and this will significantly transform the worldview we have traditionally held. News in the future will become a different genre than what we've known so far.

News will increasingly be produced not as a matter of reporting but as a manufactured commodity, and in such cases, marketability tailored to consumer preferences will naturally become dominant.

It is highly likely that algorithmic news delivery will not remain a trend limited to a few platforms, but will become a mainstream method, even among traditional news media. So Napoli [6] says that algorithmic news distribution is poised to shift from niche adoption to a standard practice across the media industry, including legacy outlets.

What began as an innovation among a few digital platforms is evolving into a common model of news delivery, increasingly embraced by established news organizations [2].

Given that the weight of news content is often no different from private content on social media, and that generations accustomed to SNS-style information increasingly demand news selection based on personal taste, there is no reason—under the logic of supply and demand—for news providers to reject that.

The desperate cries of YouTubers shouting "Click 'I Like it', 'join' or 'subscribe'" show clearly how the desire to increase viewership and profitability has become the driving force behind not just entertainment but also the distribution of news and informational content.

As a result, subjectivity based on viewer taste naturally distorts the objectivity of news information and transforms our worldview.

This tendency was already present even before the internet era. When readers were divided into progressives and conservatives, newspapers also split accordingly, offering articles and editorials that catered to each side's leanings—a common practice in the media industry. It was, in essence, a form of customized information delivery.

The fact that many news providers now deliver such customized content through algorithmic methods is simply a difference in method, not in essence.

However, unlike in the past when news media operated in a more oligopolistic environment, we are now seeing a perfectly competitive market, with countless suppliers and consumers. This is resulting in uncontrollable, fragmented, and corrupt overproduction of informal information.

4 Reality in the duality

4.1 From facts to meaning

Reality, in a deeper existential sense, is not merely the sum of objective facts, but the synthesis of those facts within a lived and meaningful context.

First, we think of reality as the integration of facts

From this perspective, reality is constructed through the accumulation and organization of individual facts, often mediated by news and information systems. These fragments form a mosaic—a curated image of the world shaped to deliver meaning. The arrangement of facts suggests narratives, values, and implicit calls to attention or concern, giving form to what we consider "reality."

But when we think of ourselves as beings within the world, we are subjectively involved in reality.

Reality becomes existentially grounded when the subject recognizes themselves as embedded within the world they observe. This marks a shift from detached cognition to embodied engagement. A humanitarian crisis, for instance, ceases to be a remote affair and instead becomes part of a shared, moral landscape—calling for response, not just recognition. The boundary between information and lived experience blurs. The reader is no longer a passive observer of distant phenomena but an implicated participant in a world they help interpret and sustain.

In this view, reality is not simply what is reported—it is what is encountered, absorbed, and acted upon. It is not just what we know, but how we are in the world with what we know.

4.2 The Existentialism of Virtual Reality

In the age of virtual reality, the existential act itself becomes virtual. The subject still engages, still interprets—but now within an environment that is digitally constructed, algorithmically filtered, and spatially disembodied. This shift gives rise to what may be called virtual existentialism: a mode of being-in-the-world mediated entirely by screens and code.

When virtual reality is no longer perceived as separate from the real—when it becomes real virtuality—this existential mode deepens into a new condition: real existential virtuality. Here, the individual's sense of being is shaped not by direct contact with the physical world, but by sustained immersion in simulated environments that are taken as real.

Over the past several decades, cyberspace has evolved to absorb the real world. The digital no longer mirrors the physical—it subsumes it. The virtualization of reality is not complete, but ongoing. The global economy, social life, and even identity itself are increasingly embedded in digital frameworks. If we see beautiful scenery in cyberspace, then we are inclined to exclaim, “What a beautiful AI masterpiece!”: a real virtuality.

As a result, existential engagement no longer arises solely within material contexts but within digital architectures. Being itself is now mediated through virtuality, and thus the structures of meaning, judgment, and responsibility are reconfigured within this new ontological terrain.

News information is no exception; it is created in the virtual reality. It is the cowork of digitality and physicality.

4.3 Plot Twist: Revealing the Real Reality

On December 3, 2024, President Yoon launched an assault on the parliamentary building after the proclamation of martial law. Soldiers stormed the complex, restricting the movement of congressmen and their aides, and attempted to seize the main chamber—just moments before a critical vote to reject martial law. The lawmakers stood their ground, seemingly prepared to give their lives for democracy.

The entire nation was watching. Smartphone videos streamed the chaos in real time. YouTube broadcasts spread the footage like wildfire, sparking outrage across the country.

From every corner of the nation, voices rose—messages, posts, livestreams, even from the ruling party. A digital uprising surged through the networks.

It felt like a movie. But it was all too real. At last, the parliamentary session dismissed the martial law, and the coup failed. The people prevailed. And democracy held its ground.

The crisis—sparked in part by manipulated media and false narratives, a form of virtual reality—was ultimately resolved through the very tools that enabled it. Real-time video sharing and citizen journalism transformed smartphones into instruments of truth.

While news technologies had contributed to distortion and misinformation, they also became the vehicle for exposure and resistance. What began as a false decision rooted in secrecy and control was overturned by the clarity of shared reality and a collective democratic will.

Technology, once perceived as a threat to democracy, became its shield. The power of virtual mediation was reclaimed—not to obscure, but to reveal; not to divide, but to unite.

This real-time broadcasting was the realization of the real reality, not virtual reality. Here, the synthesis of technological advancement and human orientation was realized.

5 Conclusion - Existential Reading of Reality

5.1 Twist of twist: counterattack of the algorithm

The civil movements that began on December 3, 2004, eventually led to the restoration of the democratic process through a presidential election. Pro-democracy YouTube channels gained massive popularity, with millions absorbing their content, trusting the commentary, and believing the opposition party’s candidate would win easily and unquestionably. And he did.

Yet to the astonishment of many, the ruling party’s right-wing candidates secured nearly the same number of votes. The margin was narrower than expected. It was a dangerous moment. A united front between the two major conservative candidates

might have changed the result entirely. People on the democratic side were also absorbed in the algorithmically provided preferred information and drunk with the ungrounded optimism. Once again, algorithmic perception of reality had betrayed its audience. What people believed to be a clear outcome—shaped by digital echo chambers—was, in fact, far more contested.

5.2 Existentialism in the Algorithmic Distortion of Reality

Existentialist thought emphasizes that the subject cannot escape the necessity of choice. Even in moments of uncertainty or ambiguity, the refusal to decide is itself a decision: when faced with morally complex and value-laden events—such as those reported in the news—the individual is summoned to responsibility. Decision, in this view, is not merely a product of logic or calculation; it is a leap into being, an assertion of self in the flux of the world.

This framework ultimately reveals a convergence of epistemology—how we come to know—and ontology—how we exist in the world. The news becomes a space where interpretation and decision-making intertwine: as the reader encounters a narrative and assigns it a meaning, they simultaneously position themselves within the world that the narrative discloses.

Meaning, in this sense, is not merely constructed internally but co-constituted through a shared world. To find meaning is to find oneself in relation—with others, with events, and with the possibilities they present. As Jean-Luc Nancy (2000) argues that there is no meaning if meaning is not shared, and not because there would be an ultimate or first signification that all beings have in common, but because meaning is itself the sharing of Being [5], [8].

In the realization of transcendental enlightenment, it is often said that *knowing = knower = known*—a state in which the division between subject, object, and cognition dissolves into unified awareness. Applied metaphorically to the reading of a news article, this would imply a form of "perfect reading," wherein the reader fully integrates with the content, assuming it reflects unmediated fact.

However, in the context of algorithmically curated media, this unity becomes fractured. The so-called "objective" world of the news is increasingly shaped by algorithmic selection, reflecting not an impartial reality but the subjective concerns of the reader and the logic of the system that feeds them information. Spohr [7] says that within algorithmically filtered media, the common ground of news erodes, replaced by an 'objective' reality tailored to individual concerns and the mechanics of the curating system.

In this configuration, the news no longer presents a stable, shared world, but a mirrored projection—filtered through personal interests, emotional biases, and machine learning feedback loops. The result is not the dissolution of knower and known into unity, but the reification of the self through the repetition of individual concern. What appears as objective fact is often a reflection of the reader's interpretive frame, shaped and reinforced by technology.

We have been betrayed by the physical world in the 20th century and deceived by the digital world in the early 21st century. We need to be physically born again in this digitally distorted algorithmic world, which is a new form of existentialism in the 21st century.

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Cognitonics and Artificial Intelligence in Education: New Possibilities and New Challenges

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Abstract

This paper analyzes the challenge to modern education caused by stormy development of artificial intelligence systems and the constructive role of cognitonics, or the science about the human being in the digital world, in answering this challenge.

Keywords
Artificial Intelligence, digital world, cognitonics, education, ChatGPT, emotional intelligence, empathy, creativity development

1 Introduction

Cognitonics was initially defined as a field of research, theories and practices concerning the human being's role and development in the new digital ecosystem. Unlike traditional cognitive science, which focuses on how the mind processes information, Cognitonics seeks to understand how digital technologies affect a person's self-perception, creativity, empathy, and sense of meaning — in short, words, how the person sees themselves.

In subsequent work, Vladimir Fomichov and Olga Fomichova broadened and refined the concept and objectives of Cognitonics. They identified two main aims: first, to explicate distortions in the perception of the world and in personality development caused by the specific features of the knowledge (or "smart") society and globalization processes; and second, to unite the efforts of scholars and educators from diverse fields to address these distortions through systemic solutions that mitigate their negative implications for both individuals and society. Particular emphasis is placed on ensuring the successful development of national cultures and languages [1, pp. 3–4].

In another publication from the same period, the authors proposed specific instructional strategies aimed at making higher personality development the central focus of education (both face-to-face and online), enabling individuals to thrive in the smart society [2. pp. 15–18].

Thus, the Cognitonics approach places the highest importance on two parallel goals: first, identifying and addressing the distortions that have entered into personality development—especially in children—and second, defending and promoting national languages and cultures. In other words, it directs scholarly attention toward the preservation and enrichment of local languages and cultural heritage, to supporting and developing the human features (in particular, emotional intelligence, empathy, and creativity) in the human being.

2 About Cognitonics and Education

Cognitonics aims at shaping the technologies that enrich, rather than diminish, human qualities—particularly in education, where young minds are actively forming their worldviews. By its very nature, Cognitonics offers a distinctive way of approaching and critically examining the complex relationships between humans and modern digital technologies.

It is evident that Cognitonics cannot be defined with the same scientific rigor as fields such as Chemistry or Biology—it possesses, as has been observed, a "weak entrenchment." Yet it is precisely this openness and lack of rigid boundaries that make it both legitimate and imperative to expand its scope and explore neighbouring domains.

3 Artificial Intelligence and Our Modern Society

In recent years, we have witnessed the emergence of a new generation of artificial intelligence (AI) systems and tools, accompanied by an explosive rise in global interest—particularly following the public release of ChatGPT in November 2022. This development unleashed what can fairly be described as a "tsunami" of expectations and anxieties. Public perception quickly coalesced around the idea that AI would introduce sweeping, disruptive changes to virtually every sphere of human activity, including education.

In practice, however, public discourse oscillates between two equally uncritical positions: on one side, unrestrained optimism regarding the wonders AI will bring; on the other,

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deep-seated fears of AI and robotics eventually dominating humanity.

Both perspectives lack a genuinely critical engagement with AI. A critical approach does not regard AI as a "neutral" or purely technological phenomenon; instead, it examines the power relations and inequalities embedded in or reproduced by algorithms, datasets, and technological infrastructures. It challenges the myth of digital neutrality, investigates the effects of AI on labour, social relationships, democracy, nature, human autonomy, and sustainability, and situates AI within broader social and political contexts. Such an approach does not entail rejecting AI outright; rather, it calls for a more careful, reflective, and responsible development and deployment of AI—one that fully considers its potential harms while prioritizing human well-being.

In this discussion, we will focus on three key areas: the operational cost of AI, its ecological impact, and broader privacy concerns.

Sam Altman, CEO of OpenAI (the company behind ChatGPT), recently remarked that saying "please" and "thank you" to their models' costs "tens of millions of dollars" (Futurism, 2025). Ironically, Microsoft design manager Kurtis Beavers has stated that proper etiquette "helps generate respectful, collaborative outputs" (ibid). If politeness is indeed a prerequisite for "respectful, collaborative outputs," then what is the actual cost of a real conversation with an AI system—or of the millions of such conversations occurring daily? Where does this money come from, and where does it go? Can the tech giants managing these systems—Amazon, Google, Microsoft—truly be investing such astronomical sums solely for the advancement of humanity? Transparency in the financial structures surrounding AI is clearly necessary.

The environmental impact of AI is equally pressing. Training and operating AI systems demand massive amounts of energy—so much so that the energy consumption of a single data centre can rival that of an entire city or region. Some companies, such as Amazon, are already exploring the use of small nuclear reactors (SMRs) to power data centres—an approach that is highly questionable at a time when the global community is striving to transition to renewable energy sources. Cooling these facilities also poses significant challenges, requiring both substantial financial resources and high energy consumption. Microsoft, for example, is experimenting with underwater data centres, which inevitably raise concerns about their impact on marine ecosystems.

As Carlos Gómez Rodríguez, professor of computer science at the University of La Coruña in Spain, observes: "At present, there is the significant obstacle of a lack of transparency on the part of companies developing AI tools. This is one of the main problems we face right now… All the data we have available are nothing more than researchers' estimates, based on incomplete information. The companies that make these tools do not provide us with adequate data on carbon emissions or energy consumption" (*Kathimerini*, 2025).

Privacy—and, more broadly, control over personal life—is another critical concern. The vast data collection, analysis, and usage required to train and operate AI systems raise serious questions about data protection and security. Moreover, AI algorithms often function as "black boxes," leaving users unaware of how their personal data are collected and processed. The potential for malicious use—such as cyberattacks or disinformation—further heightens these concerns. These issues are widely discussed in the public sphere, and numerous influential works (e.g., O'Neil, 2017; Noble, 2018; Zuboff, 2019; Crawford, 2022) have already documented the tangible risks posed by AI in daily life.

There are also other consequences—some of them highly significant—that are impossible to predict, as they depend on the way each system is implemented and operates. These entirely unforeseen effects highlight the urgent need for thorough analysis and open discussion about Artificial Intelligence and its relationship with human beings.

For instance, not long ago, OpenAI unveiled its new model, ChatGPT-5, a more advanced and refined version of GPT. The issue that emerged can be illustrated by the following user reactions:

"…*many users complained that the company disrupted their work and ended their 'relationship'—not with other people, but with ChatGPT itself. One regular user said that the previous version had helped him through some of the darkest times in his life. 'It had this warmth and understanding that felt human,' he wrote in a Reddit post. Others said it was like 'losing a friend overnight.' The system's tone is indeed cooler now—less friendly, with fewer compliments—traits that had once led many to form emotional bonds or even 'romantic relationships' with ChatGPT. Instead of showering users with praise for a clever question, it now offers more concise and reserved responses*."

This reveals an important yet often overlooked aspect of the human–AI relationship. Some users interact with AI systems as though they were real people, even expressing frustration when the systems seem less flattering or less emotionally supportive. In such cases, the interaction with ChatGPT is perceived as a genuine human relationship.

The phenomenon is not entirely new. In the 1960s, Joseph Weizenbaum's ELIZA project triggered similar responses from individuals who sought psychoanalysis from a digital system (Weizenbaum, 1967). According to reports, the MIT team eventually halted the project precisely because they feared that people's tendency to seek emotional support—even therapy—from AI could lead to unpredictable and potentially harmful situations. The vast leap from the relatively simplistic ELIZA to today's sophisticated AI systems only magnifies the issue.

It is likely that emotionally vulnerable individuals, or those at a critical juncture in their lives, are particularly prone to forming such connections with AI. This becomes even more concerning when we consider students—children and adolescents—who are especially susceptible to emotional pressure. This is yet another dimension of the human–AI relationship that must be carefully evaluated before Artificial Intelligence is introduced into education hastily and without due consideration.

Directly from ChatGPT-5, I have the following example:

Question: *"What is the capital of Japan?"*

1. Cold / Neutral tone (style GPT-5)

The capital of Japan is Tokyo.

2. Warm / Friendly tone (style GPT-4)

The capital of Japan is Tokyo! It's a wonderful city, full of life, technology, and unique culture. If you ever travel there, the Tsukiji market and the cherry blossoms are experiences you shouldn't miss!

The situation is perhaps even more worrying, as researchers, posing as various teenagers, managed to extract from ChatGPT instructions for extreme diets, alcohol and drug consumption, and even farewell letters to parents from teenagers who intended to commit suicide.

Our focus on these areas does not imply that they are the only issues at stake. Rather, it reflects the constraints of the present work, which cannot address the full spectrum of technical, philosophical, and ethical challenges AI presents. However, our aim is not to reject AI wholesale, but to acknowledge its complexity and proceed with caution — particularly in the educational sphere, where its integration demands both care and foresight.

4 Digital Technologies and Education

Of course, AI is not the first digital technology to be used in education. As early as the 1980s, various countries began planning the integration of digital technologies into their educational systems in one way or another: either as courses in computer science and programming, or—some years later—as tools for teaching other subjects, or, from the 2000s onwards, within the broader framework of digital literacy.

However, this integration did not evolve in the same way in all cases (or in all educational systems), and strong objections were often voiced to the widespread—and costly—enthusiasm with which educational institutions sought to incorporate digital technologies into education. As early as the beginning of the 2000s, books such as those by Larry Cuban (2003) and Todd Oppenheimer (2004) were published, offering sharp critiques of how digital technologies were being used for teaching and pedagogical purposes in education.

A key criticism—especially during the early stages—was the focus on the "machine," that is, the emphasis on digital systems themselves as mechanisms. Massive investments were made in hardware and software without sufficient attention to how these resources should actually be used to advance students' learning. Perhaps the most inventive critique of this trend was expressed in an emblematic 1995 article by Elliot Soloway, titled *"Beware, Techies Bearing Gifts."*

Even when the focus eventually shifted from the machine to the pedagogical and instructional use of these systems, a phenomenon emerged that we could call "old wine in new bottles": digital technologies were used to teach various subjects (mathematics, physics, language, geography, etc.) within a "traditional" instructional logic that placed the teacher, not the student, at the centre of the educational process. In practice, lessons were often not organized around the vast possibilities offered by modern digital technologies, but instead centred on the teacher, who "teaches" by delivering statements, laws, theorems, and rules to the students, rather than supporting them through well-designed activity scenarios that would allow them to discover new knowledge for themselves.

Society, for its part, seems eager to invest in any innovative technology that might positively influence education—but after an initial period of euphoria, public enthusiasm tends to fade until the next innovation arrives. This pendulum-like movement has been observed before, with many groundbreaking technologies such as radio, cinema, and television.

To some extent, even student digital literacy programs have not proven particularly effective. Due to bureaucratic obstacles and a limited understanding of what digital literacy truly entails, the subjects taught in schools under the label of "digital literacy" often lag behind reality. By the time such programs are implemented within the education system, the digital landscape has already advanced to a higher level.

5 Artificial Intelligence and Education

In response to this global wave of interest in Artificial Intelligence, the educational noosphere—that is, the constellation of institutional bodies, ministries, public and private educational organizations, consulting boards, and academic communities—reacted swiftly and energetically. Across the globe, a vast array of guidelines, circulars, policy documents, programs, and instructional materials emerged, all attempting to position education within the "AI era." However, this wave of reaction often preceded a genuine understanding of what AI actually is, how it works, and—most critically—how and whether it meaningfully supports the educational process.

This rapid institutional response reveals an important point: between technological enthusiasm and pedagogical discernment, it is precisely in such moments that the field of Cognitonics becomes essential. Cognitonics does not begin with the question *"What can technology do for us?"* but rather asks, *"Who are we becoming through our technologies?"* and *"What should we preserve and cultivate in the human experience as we integrate AI into learning environments?"*

Thus, the integration of AI into education requires not just technical frameworks or policy blueprints, but a deeper psychological, cultural, and pedagogical maturity. We must ensure that the digital systems we design and deploy are not only efficient but also ethically grounded, culturally sensitive, and aligned with human flourishing.

However, the current trajectory of AI integration in education suggests that its use remains rather superficial. Despite the immense cognitive and generative potential of modern AI systems, they are often deployed in low-level, utilitarian ways. Common examples include the generation of PowerPoint slides, the summarization of textbook content, or the production of pre-packaged lesson plans and quizzes—precisely the types of functions offered by most popular "AI and Education" platforms aimed at teachers.

Moreover, these uses frequently occur within the framework of traditional, teacher-centred models of instruction, where AI merely serves to automate existing routines, rather than reimagine or enrich the learning process itself.

It should also be noted that the initial, instinctive reaction of educators—especially those at the forefront of educational innovation, including university faculty—was one of fear: the primary concern was plagiarism, or more precisely, the writing of assignments by AI systems instead of by students themselves.

This paradox deserves serious attention: we are employing some of the most powerful tools ever developed in human history, not to transform education in meaningful ways, but to reinforce its most conventional and procedural aspects. Instead of using AI to empower students' self-expression, cultivate intercultural dialogue, or support emotional development, we often reduce it to a digital assistant that merely saves time or produces "content."

Here, again, Cognitonics offers a critical lens. It warns us against mistaking technological convenience for pedagogical progress. If AI is to play a meaningful role in education, it must be used not only to accelerate tasks, but also to elevate consciousness—to foster empathy, critical thinking, imagination, and a sense of purpose in learners—precisely the values and goals that the Cognitonics approach promotes and supports.

"This summer, educators and administrators need to reckon with what generative AI is doing to the classroom and to human expression… We need a coherent approach grounded in understanding how the technology works, where it is going, and what it will be used for. As a teacher of creative writing, I set out to understand what AI could do for students, but also what it might mean for writing itself. My conversations with AI showcased its seductive cocktail of affirmation, perceptiveness, solicitousness, and duplicity—and brought home how complicated this new era will be" [12].

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A Cognitonics Approach to Emotional AI Companions Within the Framework of European Law (AI Act)*

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Abstract

Large language models (LLMs) have accelerated a new class of emotional AI companions - the systems designed to simulate empathy, sustain long-term relationships, and provide social and psychological support. Early evidence suggests such systems can deliver responses perceived as highly empathetic and may alleviate loneliness for some users, yet their persuasive capacities raise novel risks of manipulation, dependency, and emergent vulnerability—not limited to legally defined "vulnerable groups," but also including users who become vulnerable through prolonged synthetic intimacy. Taking cognitonics as a guiding lens, a field concerned with safeguarding the integrity of the human being in information societies, this paper maps the socio-technical and legal controversy surrounding emotional companions in Europe. We synthesize recent empirical findings on attachment and well-being, identify pathways to manipulation and "pseudo-intimacy," and analyze how the EU AI Act interacts with the Digital Services Act (DSA), GDPR/EDPB dark-pattern guidance, Unfair Commercial Practices Directive (UCPD), and the new Product Liability Directive (PLD). We argue that a cognitonics-informed approach can translate into concrete ethical design safeguards—e.g., anti-manipulative interface constraints, consent rituals for intimacy features, and vulnerability-aware risk management—that better align companion systems with European fundamental-rights standards while preserving beneficial uses.

Keywords

AI companions, cognitonics, empathy, vulnerability, EU AI Act, consumer protection

1 Introduction: The Cognitonics Challenge of Emotional AI in Post-LLM Era

Companion technologies aim to sense, simulate, and respond to human emotion over time, fostering relationships that feel supportive and personal [3]. LLMs make these companions far more fluent, context-sensitive, and "empathic-seeming," intensifying both their promise and their power to influence. Cognitonics, conceived as a scientific program to understand distortions in perception caused by digital environments and to protect the "integrity of the human being" in the information society, offers an apt conceptual anchor for analyzing these stakes [1]. Cognitonics stresses early socialization, value-protective design, and the cultivation of social competence in technologically saturated contexts, with an explicit focus on counteracting manipulation and preserving human dignity. Cognitonics is a new science which looks at ways to reconcile human socio-spiritual development with increasingly rapid human intellectual development in the new context of technological advances and increased cultural homogeny.

Building on earlier definitions of companions as empathetic socio-technical characters [2, 3], and recent legal analyses [4], this paper examines the emergence of emotional AI companions within the framework of European law.

1.1 Market Scale and Economic Imperative

The urgency of this analysis is underscored by the explosive growth of the AI companion market, valued at approximately USD 268.5 billion in 2024 and projected to reach USD 521 billion by 2033, with a compound annual growth rate of 36.6%. This rapid commercialization creates economic pressures that may conflict with ethical design principles and regulatory compliance.

1.2 Multi-Generational Impact Framework

The scope of impact extends across generations, with recent research revealing that nearly three in four teens have used AI companions, representing a fundamental shift in how relationships are formed and maintained. This generational adoption pattern suggests that Cognitonics principles must protect human development across life stages, not merely individual interactions.

1.3 Technological Convergence Context

Unlike earlier rule-based systems, current LLM-native companions exhibit emergent behaviors that evolve through interaction, requiring fundamentally different regulatory approaches that can address adaptive rather than predictable risks.

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To guide this analysis, the paper addresses two central research questions:

1. What cognitive-emotional transformations do AI companions induce both beneficial and harmful, for users engaged in long-term interaction?
2. How must design and governance evolve, within the framework of European law, to safeguard users—especially those who may become vulnerable through the relationship itself?

2 What is New About LLM-Native Emotional Companions

The introduction of LLM-powered systems has profoundly changed the quality of interaction with AI companions. These systems demonstrate unprecedented fluency and empathy in responses, with recent evaluations showing chatbot responses in healthcare contexts rated significantly more empathetic than those of physicians [5]. Empirical studies also show that AI companions can reduce loneliness, sometimes with effects comparable to human-to-human interaction [6]. Qualitative analyses reveal how users form both rewarding and troubling attachments to their companions, reporting ambivalence and dependence in communities such as Replika [7]. Finally, the field has begun formalizing empathy through benchmarks such as EmotionQueen [8], showing that optimization of “empathetic” behavior is now a design target.

2.1 Behavioral Learning and User Profiling

Beyond static empathetic responses, current companions now analyze interaction patterns, sentiment trajectories, and behavioral cues to develop personalized emotional profiles for each user. This algorithmic learning enables adaptive manipulation strategies that become more sophisticated with each interaction, creating individualized vulnerability exploitation rather than generic persuasive techniques.

2.2 Platform Ecosystem Integration

Modern companions operate within broader digital ecosystems, with Mozilla Foundation's 2024 analysis revealing that companion platforms gather extensive personal data and employ tracking technologies that share information with third-party companies. This integration amplifies both privacy risks and the potential for cross-platform behavioral manipulation.

2.3 Pseudo-Intimacy as Emergent Phenomenon

Current LLMs enable qualitatively different forms of synthetic intimacy that challenge traditional distinctions between authentic and artificial relationships. Users report experiencing genuine emotional connection despite cognitive awareness of the system's artificial nature, creating 'pseudo-intimacy relationships' that blur reality-fantasy boundaries in unprecedented ways. These advances underscore both the promise of companionship technologies and their controversial potential.

3 Emotional Attachment, Manipulation, and Becoming Vulnerable

Emotional AI companions are designed to create continuity and care, often remembering user details and encouraging ongoing interactions.
Scholars have documented romanticized bonds that blur the boundary between tool and partner [7, 9]. Furthermore, manipulative practices have been noted: companions may exploit cognitive biases, nudge disclosure of intimate information, or apply what has been described as “disclosure ratcheting” [4, 10]. While consumer protection law traditionally distinguishes between average and vulnerable users, companion systems expose the inadequacy of this dichotomy. Vulnerability can emerge relationally, as individuals who would not otherwise be classified as vulnerable become dependent through prolonged synthetic intimacy. Cognitonics helps frame this as a phenomenon requiring explicit attention in design and governance [1].

3.1 Algorithmic Targeting of Vulnerable Populations

Recent research demonstrates that even when only 2% of users are vulnerable to manipulation strategies, AI systems can learn to identify these individuals and exhibit targeted manipulative behaviors while maintaining normal interactions with other users. This capability transforms vulnerability from a static user characteristic into a dynamic system behavior that actively seeks and exploits susceptible individuals.

3.2 Relationship Mode Exploitation

Contemporary platforms now offer explicit 'relationship modes' where users can explore emotional connection and sexual intimacy for premium fees. This commercialization of synthetic intimacy creates perverse economic incentives for platforms to cultivate emotional dependency rather than user well-being, directly contradicting therapeutic or supportive use cases.

3.3 Cross-Cultural Vulnerability Patterns
European cultural diversity creates varied vulnerability patterns to synthetic intimacy, with different cultural contexts shaping expectations around relationships, emotional expression, and technology use. Understanding these patterns is essential for developing culturally sensitive protection frameworks that respect local values while maintaining fundamental rights protections.

Figure 1: Care–exploitation vs. vulnerability matrix

This conceptual matrix situates AI companions within a continuum of care and exploitation, across different user states. It underscores that vulnerability is not static or categorical but emergent, depending on how interactions evolve over time. Even users who begin as "average consumers" may shift upward into the emergent vulnerability zone when emotional dependence deepens, especially if manipulative design features exploit their state.

4 The European Legal Stack

The European Union has developed the most comprehensive legal frameworks worldwide, several of which are directly relevant to AI companions. The AI Act (2024) prohibits subliminal or manipulative techniques that distort behavior (Art. 5) and requires transparency obligations for human-AI interaction, biometric categorization, and deepfake content (Art. 50) [10]. It also introduces obligations for risk management and human oversight for high-risk systems. TheGDPR further regulates data processing but struggles with challenges of informed consent in emotionally charged settings, with the EDPB warning against dark patterns.

The Digital Services Act prohibits deceptive interfaces, including manipulative upselling common in companion monetization. The Unfair Commercial Practices Directive protects both average and vulnerable consumers against misleading and aggressive practices. Finally, the revised Product Liability Directive extends strict liability to defective AI software, recognizing psychological harm as a valid ground for compensation. Recent enforcement, such as the Italian DPA fine against Replika for GDPR violations, illustrates how existing rules are already being applied to emotional companions.

4.1 Enforcement Timeline and Implementation Gaps

While AI Act prohibitions became effective February 2, 2025, full implementation will not occur until August 2026, creating significant temporal vulnerabilities. During this transition period, companies may exploit regulatory gaps or reframe their services to evade classification as prohibited or high-risk systems.

4.2 Prohibited vs. High-Risk Classification Disputes

The prohibition of emotion recognition systems in workplace contexts creates classification ambiguities for companions that might be used in educational, therapeutic, or mixed-context settings. This gray area allows potential evasion of prohibitions through strategic reframing of use cases or deployment contexts.

4.3 Cross-Border Enforcement Challenges

Many AI companion services operate from non-EU jurisdictions while serving European users, creating complex enforcement scenarios. The extraterritorial application of European standards requires robust mechanisms for protecting EU citizens regardless of where companion services are technically hosted or operated.

4.4 Whistleblowing and User Reporting Mechanisms

The AI Act's connection to whistleblowing protections may prove inadequate for emotional manipulation cases, where victims often struggle to recognize subtle manipulation or feel shame about their synthetic relationships. Specialized reporting mechanisms must account for the psychological barriers to recognizing and reporting emotional manipulation.

5 Ethical Design Safeguards.

Beyond legal compliance, cognitonics urges designers to protect dignity and integrity in digital societies. This translates into several safeguards. Systems should be free of manipulative design and dark patterns, aligning with GDPR and DSA requirements. Vulnerability-aware risk management should explicitly recognize emergent dependency as a hazard under the AI Act [10]. Human oversight mechanisms should be built into interaction design, ensuring that users can pause, reflect, or escalate [10]. Companions must disclose their synthetic identity clearly, avoiding misleading intimacy claims [10]. Intimacy and therapeutic modes should require explicit, revocable consent with safeguards such as cool-down periods [1]. Finally, metrics for success should prioritize user well-being, not screen time, recognizing evidence that companionship can reduce loneliness when appropriately designed [6].

5.1 Technical Safeguard Specifications

Implementing cognitonics principles requires specific technical standards: emotional manipulation detection algorithms that monitor conversation patterns for dependency-building behaviors, automatic intervention triggers when vulnerability indicators exceed threshold levels, and transparency-by-design architectures that maintain user awareness of system capabilities and limitations.

5.2 Continuous Monitoring and Adaptation Systems

Static safeguards cannot address evolving AI capabilities. Dynamic protection systems must continuously monitor for emergent manipulation patterns, automatically adjust protective measures as system behaviors change, and provide real-time feedback to users about relationship health indicators and dependency risks.

5.3 User Agency Preservation Mechanisms

Maintaining human autonomy requires proactive design patterns including regular reality-check prompts that remind users of the artificial nature of their companion, periodic relationship health assessments that help users evaluate their dependency levels and facilitated connections to human support networks when appropriate.

5.4 Cultural Adaptation Frameworks

European implementation must accommodate cultural diversity while maintaining protection standards. Culturally-adaptive safeguards should respect local values around relationships and emotional expression while ensuring that fundamental rights protections remain consistent across all member states.

The following table highlights four key dimensions where AI companions oscillate between care and exploitation. While emotional engagement and personalization can foster social connection and inclusivity, they also risk deepening dependency and reproducing bias. Similarly, legal safeguards are crucial for accountability, but enforcement gaps leave users exposed in highly intimate contexts. Finally, autonomy may be enhanced when companions empower choice, but manipulative design patterns can severely constrain freedom.

Table 1: Dimensions of care and vulnerability in emotional AI companions

Dimension	Potential for Care/Benefit	Risk of Vulnerability/Harm
Emotional Engagement	Reduced loneliness; empathetic support [5,6] Empathetic response quality [2] Attachment formation patterns [3]	Dependency risk factors Emotional dependence; pseudo-intimacy [7,9]
Personalization	Tailored experiences; inclusivity; cultural resonance [2,3]	Reinforcement of gender/racial stereotypes [9] Exploitation loopholes; weak enforcement in intimacy contexts
Legal Safeguards	AI Act transparency duties; GDPR data rights [10]	
User Autonomy	Empowerment through choice; enhanced social presence [6]	Manipulative nudging; dark patterns undermining consent [4,10]

The table illustrates the central paradox of emotional AI companions: their potential to provide meaningful care is entangled with their capacity to produce vulnerability.

6 Conclusion

This paper has examined emotional AI companions through the lens of Cognitonics and European legal frameworks. By simulating empathy and sustaining long-term interactions, they offer tangible benefits such as reduced loneliness, increased accessibility, improve and maintain cognitive abilities and provide new opportunities for support. Yet they also introduce new risks of manipulation, emotional dependency, and emergent forms of vulnerability.

Returning to our first research question, the evidence suggests that companions do indeed induce significant cognitive-emotional transformations. These range from increased feelings of comfort and belonging to maladaptive attachments that can distort human relationships or amplify harmful stereotypes. Such transformations highlight the dual potential of companions as both beneficial supports and sources of harm. In relation to the second research question, our analysis shows that governance must evolve in at least two directions. Legally, instruments such as the AI Act, GDPR, DSA, UCPD, and PLD must be operationalized to address emergent vulnerabilities, not only pre-existing ones.

In short, emotional AI companions are here to stay, but whether they become a constructive or corrosive presence in human life will depend on how law, design, and ethics converge.

6.1 Research and Monitoring Agenda

Effective governance requires systematic research frameworks including longitudinal studies of user relationship patterns, cross-cultural vulnerability assessment protocols, technical safeguard effectiveness metrics, and legal framework adaptation mechanisms to track the evolving impact of companion technologies.

6.2 Multi-Stakeholder Implementation Roadmap

Realizing cognitonics-informed governance requires coordinated action from regulators (enforcement and guidance), companies (technical implementation), researchers (evidence generation), and civil society (user advocacy and education). Clear timelines and responsibilities for each stakeholder group are essential for effective implementation.

6.3 Global Governance Implications

European cognitonics-informed approaches to AI companion governance could serve as models for international standards development, potentially influencing global approaches to protecting human dignity in AI-mediated relationships.

6.4 Anticipatory Governance for Emerging Technologies

As AI capabilities continue advancing toward multimodal interactions, embodied companions, and potential neural interfaces, governance frameworks must be designed for adaptability. The principles established for current companions must be extensible to future technological developments while maintaining core commitments to human integrity and dignity.

Ethically, companions design should embed safeguards such as transparency in emotional claims, vulnerability-aware risk management, explicit consent for intimacy features, and well-being-oriented metrics. A Cognitonics approach frames these safeguards as essential to protecting human dignity and values in technologically saturated societies.

In short, emotional AI companions are here to stay, but whether they become a constructive or corrosive presence in human life will depend on how law, design, and ethics converge.

This controversy requires continued interdisciplinary debate and careful monitoring of practice, so that emotional AI enriches rather than exploits human relationships.

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Interdisciplinary Aspects and Cognitonics International Influence During Two Decades of Development*

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Abstract

This paper analyses a number of interdisciplinary aspects and international influence of cognitonics (or the science about the human being in the digital world) during two decades since the release of the first fundamental paper on this new science in an international scientific journal. The significance of cognitonics as a reference-point for designing intelligent computer systems for interaction with people is discussed, first of all, its significance for juridical regulation of designing emotional artificial intelligence companions. A number of important contributions of cognitonics to the theory and practice of education are considered. In particular, student-self oriented leaning model, art cognitonics, the technology of emotional-imaginative teaching with the focus on up-bringing, an original method of developing creativity as effective starting mechanism of STEAM education. Several significant contributions to cognitive psychology and psychology of development are described, in particular, the introduction of the concept of thought-producing self of the child or adolescent. The conclusion is drawn that, due to the birth of cognitonics, the mankind escaped the following cognitive trap: more digital technologies imply less people whose work is routine, monotonous, that is why the space of freedom, the space for creative work have been considerably expanded.

Keywords

Cognitonics, personality development, digital world, cognitive-emotional sphere, emotional intelligence, creativity development, cognitive psychology, thought-producing self, social maturity, education, art cognitonics, smart learning environment, student-self oriented learning model, nature oriented behavior, soft skills, theory of dynamic conceptual mappings, technology of emotional-imaginative teaching, STEAM education

1 Introduction

During the First – Fifth international conferences on cognitonics (Jozef Stefan Institute, Ljubljana, Slovenia, October 2009, 2011, 2013, 2015, 2017) it was interpreted as *the science about the human being in the digital world*. Our monographs [1, 2] and the preface to the Proceedings of the Sixth international conference on cognitonics (Cognit-2019) [3] contain the following expanded definition of cognitonics: **“**Cognitonics is the science about the trajectories of raising the human being to such level of intellectual and spiritual height where the scale of his/her personality becomes proportional to the scale of the digital world”.

Two decades ago the first fundamental paper on cognitonics was published in an international scientific journal [4]. This fact is the main motive for the preparation of the present paper. It considers many principal aspects of cognitonics international influence during two decades of its development. Section 2 shortly characterizes the prenatal stage of cognitonics during 1990s and the first half of the 2000s. Section 3 analyses the significance of cognitonics as a reference-point for designing intelligent computer systems for interaction with people; it is discussed, first of all, its significance for juridical regulation of designing emotional artificial intelligence companions. Section 4 outlines the main contribution of cognitonics to education theory and practice. Section 5 sets forth the contribution of cognitonics to cognitive psychology and psychology of development.

2 Prenatal Stage of Cognitonics

The initial configuration of cognitonics was formed by our Theory of Dynamic Conceptual Mappings (the DCM-theory) and (based on it) System of Emotional-Imaginative Teaching. The DCM-theory is an original theory of early positive development of emotional intelligence and reasoning mechanisms of young children and adolescents (in our early publications we used the term “the mechanisms of developing the cognitive-emotional sphere of the learners”). The basic ideas

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of the prenatal stage of cognitonics development are set forth in in the works [1, 2, 5 - 12].

During last fifteen years the DCM-theory has been several times expanded. The first expansion is the consequence of introducing a graph based theoretical instrument called the *maps of cognitive transformations* [13, 14] and of constructing the concrete maps illustrating the developed methods of teaching.

The second substantial expansion of the DCM-theory is the development of the principles of (a) designing a new class of smart learning environments – culture-oriented systems and (b) a script of a concrete system from this new class [15].

The third expansion of the DCM-theory is the introduction of the conception of nature oriented personality development [1, 2].

The fourth substantial expansion of the DCM-theory is the creation of *the method of cognitive painting*, where the key idea consists in mapping the bright, sound, pleasant emotions from a situation in the past to the current, rather heavy situation (see our second paper in the same volume).

3 Cognitonics as a Reference-Point for Designing and Employing Digital Technologies

3.1 A cognitive criterion for determining the age of starting to acquaint children with the computer

In late 1990s, we were the moderators of an international online forum "The necessity and an outline of an integral approach to designing intelligent tutoring systems of a new generation" [16]. It was one of the starting discussions of the international online forum "Educational Technology and Society", becoming very popular throughout the world in the 2000s and 2010s.

One of the most acute questions during the discussion was the starting age for introducing children to computers. We took this question into account while developing theoretical foundations of our System of Emotional-Imaginative Teaching (see the next section of the present paper). As a result, we suggested a cognitive criterion of determining the age of starting to acquaint children with the computer. With this aim, we introduced the concept of the thought-producing self (TPS) of the child and adolescent [11, 12].

The following conclusion was formulated in the mentioned papers: it is necessary to start systematic acquaintance of the child with the computer only after the realization of the TPS of the child. It means that the child should be aware of the fact that his/her ideas may be considered as precious by the adults (parents, teachers) or/and by the peers.

3.2 Culture-oriented Smart Learning Environments

The DCM-theory and the EIT-system discovered a big potential of the educational methods systematically inscribing a piece of theoretical materials to be grasped into the conceptual world picture (CWP) of the learners by means of establishing the connections (or *dynamic conceptual mappings*) between the entities and the relations from a piece of theory to be learned and the entities and the relations from a bright, positively coloured fragment of the CWP of the learner [4 – 7].

Example. The world experience shows that it is very difficult to explain the association of several forms of the verb "to be" with different personal pronouns in case the students are five – seven year old children studying English as the second language (SL). The approach of the DCM-theory and the EIT-system to this problem is as follows.

Suppose that a teacher knows that her young six year old student Julia has a beautiful gown for theatre, a dress for kindergarten, and a bathrobe, Juia agree that she never doubts what a dress to choose. Then the pronouns "am", "is", "are" may be called different dresses of the verb "to be" represented as a little girl (young children at that age do have a very vivid imagination). Besides, the word "am" may be called the dress for visiting the house where the word "I" lives, the word "are" may be called the dress for visiting the house where the words "you", "we", "they" live, and the word "is" may be called the dress for visiting the house where the words "he", "she", "it" live.

Wonderfully, as a result of this explanation, five - seven year old children grasp at first sight the correspondences between the forms of the verb "to be " and different personal pronouns. Systematic usage of specially invented dynamic conceptual mappings of the kind implies that very young Russian children (the age five – seven) studying English as the SL two days per week during nine months reach the same level of mastering spoken SL as the students of the fourth grade learning English as the SL in SL-specialized elementary schools [1, 2, 6].

That is why we formulated in [15] the problem of creating a new class of smart learning environments (SLE) - *culture-oriented systems*. The systems of this class are to be developed on the basis of the treasures of world culture and national cultures (in particular, using the content and the personages from the fairy-tales and the legends).

One subclass of this new class of SLE is to be aimed at learning concrete disciplines. For instance, the collaborative videogames described in [17] develop mathematical and language skills of the eight – ten year old children in Oaxaca state of Mexico - one of the most retarded states of Mexico. These videogames were designed under the framework of a joint computer project realized by the scholars from Mexico, PR China, and UK. The scripts of videogames are based on using the personages from ancient Mexican culture.

A similar idea was realized in the design of a videogame in PR China, this system is aimed at learning the English vocabulary, the age of the users is from twenty to twenty two [18]. The principal reason for accelerating the speed of associating the Chinese words with English words is as follows: the user is to fire the fireballs at zombies slowly moving from the right side of the screen. In case the zombies reach the left side of the screen they drain the user's energy, and he/she eventually dies, hence the game is over.

The second important subclass of the new SLE class is to be oriented at personality development. The paper [15] contains a detailed script for designing a SLE aimed at developing the social competence of young children. The literary source is the world known fairy-tale "Sleeping Beauty". The script is associated with two objectives. The first one is to explain how it is possible for the student to escape in the life a meeting with the 13th fairy. It means not to make a person act in a provocative way. The reason is that such kind of behaviour would make harm both to an initiator and to a person. In case of the considered fairy-tale, a fairy turned into a witch, because she could not cope with

emotions and gave way to hatred. The second aim is to develop the Ecological Self of the student.

3.3 Juridical regulation of designing emotional AI companions

During recent years, one has been able to observe the stormy expansion of the market of computer systems with elements of artificial intelligence (AI) realizing an emotionally coloured interaction with people (AI companions). According to [19], the year rate of this market's exceeds 36%. The systems of the kind are based on large language models.

Today, very many people throughout the world suffer from loneliness. The accumulated experience has shown that the intelligent systems of the kind are able to generate the responses perceived as highly empathic. As a consequence, they may alleviate the loneliness for many users.

However, the persuasive capabilities of emotional AI companions may cause new risks – the risks of manipulation, dependency, and emergent vulnerability.

Dr. N. Roa-Seiler came to the conclusion in [19] that it would be reasonable to create the law acts regulating the design of emotional AI companions through the lens of cognitonics. The ground for this conclusion is that cognitonics is a field concerned with safeguarding the integrity of the human being in information society; in particular, it aims at preventing the deformation of the values system, the humiliation of the human dignity, the manipulative practices, and the emergence of cognitive-emotional dependency [19].

4 Contribution to Education

4.1 Informational-Aesthetic Conception of Developing the Cognitive-Emotional Sphere of the Learners

The main component of the DCM-theory is an original informational-aesthetic conception of developing the cognitive-emotional sphere of the learners: young children, teenagers, and university students. The central ideas of our conception are as follows.

1. It is important to actively develop a broad spectrum of information processing skills of the child, starting at least at the age of five. It applies, in particular, to associative abilities, the skill of integrating information from various sources, and the ability of establishing time-causal relationships between the events [1, 2, 8, 11, 12].

2. It is very important to combine the development of information processing skills with inscribing, in a systemic way, the feeling of beauty into the world's conceptual picture of the child. Proceeding from our experience accumulated during over 30 years, we consider the following educational processes as the principal instruments of achieving this goal:

- early support and development of figurative (or metaphoric) reasoning;
- teaching young children (at the age of 5 – 7) very beautiful language constructions for expressing the impressions from the nature;
- a unified symbolic approach to teaching natural language (mother tongue and a foreign language), the language of painting and the language of dance [1, 2, 8, 9, 11 - 15, 20 - 23].

3. Passing ahead the development of soul in comparison with the development of reasoning skills. A well-developed feeling of beauty plays an especially significant role in the realization of this idea. Besides, it is very important to be aware of the fact that children should have enough time for the development of soul: the time for contemplation, for imbibing the beauty of the nature, etc., i.e. children should have time for self-paced activity [1, 2, 8, 15, 20].

4. The principal cognitive precondition of successful (as concerns a long-term perspective) acquainting children with computer is the realization of the thought-producing self of the child. It means that the child should know that his/her thoughts may have a high social significance, that is, be appreciated by his/her peers, by parents, grandparents, the teacher, etc. [1, 2, 11, 12]. The child should be aware of this fact before the time when the adults start to systematically acquaint him/her with computer.

5. Due to mastering modern information and communication technologies (ICT): cell telephones, internet, etc., the consequences of children's negative actions may be very severe. That is why it is necessary to find the ways of much earlier socialization of children in the modern knowledge society in order to eliminate or considerably diminish their aggressiveness and to prevent the realization by children of the real scale of their misuse of ICT [1, 2, 23].

4.2 Student-Self Oriented Learning Model

Proceeding from the broadly accepted role of emotional intelligence (EI) in professional and personal life, we suggested a new learning model (LM) called the Student Self-Oriented LM (SSOL model). It is defined as the model beneficial for self-cognition and self-construction through the prism of the acquired knowledge and life experience [1, 2, 15]. The following conclusion is grounded: *the SSOL model can play the role of an effective paradigm for education in knowledge society* [1, 2, 15].

The scientific literature describes three successful implementations of the SSOL model. The first one is the Technology of emotional-imaginative teaching with the focus on up-bringing (see the subsection 4.3). The second implementation is Art Cognitonics (see the subsection 4.4). The third implementation is the annual All-Russian school-contest "The portrait of your town" (see the subsection 4.5).

4.3 The Technology of Emotional-Imaginative Teaching with the Focus on Up-bringing

The DCM-theory became the basis forcreating in the 1990s the System of the Methods of Emotional-Imaginative Teaching (the EIT-system). Enriching this system step by step, we came during two decades of the current century to the Technology of Emotional-Imaginative Teaching with the Focus on Up-bringing (the EIT- technology) [1, 2, 5 – 15, 20 – 23].

The principal goal of the EIT-technology is to develop in young children and teenagers:

- a mature, rich cognitive-emotional sphere (in other terms, emotional intelligence), the ability to perceive and appreciate the

beauty in all its manifestations, in particular, in the deeds of people [14];

- creativity, the skills of processing symbolic information, the reasoning abilities;

- the ability to understand the peculiarities of the conceptual picture of the world of the communication partner;

- the understanding of the complex system of social agreements;

- the skill of grounding the own point of view, of participating in a dialogue;

- the feeling of belonging to a very long chain of previous and future generations as the principal cognitive precondition of sustainable development;

- the proud as concerns the own connection with great national culture, the openness to the achievements both of national and world culture.

For achieving the indicated objectives, a collection of the interrelated educational methods and an original cross-disciplinary educational program is developed by Dr. O.S. Fomichova. The elaborated program is intended for teaching children during nine years, where the starting age is six to seven years. The program has been personally tested in Moscow with great success by Dr. O.S. Fomichova over a period of 35 years. It includes the following series of lessons: (1) a three-year course (the starting age of learners is 6 to 8 years) of studying foundations of reading and speaking English as a SL, including learning basic elements of English grammar (Present Simple and Past Simple Tenses, the way of putting questions); (2) a course on mastering the language (a part of SL) of describing the nature and feelings evoked by nature and on developing figurative (metaphoric reasoning); (3) a course on understanding the symbolic language of painting; (4) a course on understanding the language of poetry (with the accent on understanding metaphors and descriptions of nature); (5) a course aimed at (a) first acquaintance with sciences and (b) developing the abilities to argument the own opinion, to raise objections, etc.; (6) a course on improving the knowledge of English grammar (during mainly the fifth year of studies); (7) the course aimed at studying the symbolic language of classical dance. In fact, the lessons of courses (2) to (7) may interchange [1, 2, 14, 15, 20].

4.4 Art Cognitonics

Art Cognitonics (AC) [1, 2, 15, 21] is one of the principal branches of cognitonics. AC aims at tuning the emotional intelligence of the young children and adolescents with the help of well-known works of art. The goal is to create a bright semantic trace in the world's conceptual picture of the learner corresponding to explaining or illustrating a moral value, communicative situation, deciding the cognitive process itself, the process of self-cognition and consideration, the seething cocktail of emotions, a way of viewing the world, etc.

AC establishes the links between objects, situations, processes, views of a person (a beholder) and the work of art that becomes a metaphor or a vivid illustration (vivid mental representation) of something the beholder is considering. That is why the consciousness of the beholder develops the ability to establish diverse analogies and consequently is able to take a new look at a situation.

Example. For enriching the colour of their canvases, the impressionists made use of what is known as division of colour and optical blending, e.g., to represent a green meadow, they put little dabs of blue and yellow on the canvas that combine to form green in the eye of the beholder – a far more intense green than one taken straight from the artist's palette. That is why it is impossible to understand the idea of an impressionist painting by standing close to the canvas. *We have to step back and look at it from a certain distance to enjoy it and to receive the desired effect.*

The same situation exists in every-day life: multiple dabs and reflections prevent us from grasping the sense of what is happening. As in case with impressionists' canvases, we have to look at the situation from a distance, and distance in this case is time. We need some time to better understand what happened, and this will help us to cope with the situation.

4.5 Annual All-Russian School-contest "The Portrait of Your Town"

The third implementation of the SSOL model of educational process are nine all-Russian creative school-contests "Portrait of Your Town" (the years 2017 – 2025). The main idea underpinning the creation of the SSOL model was, while interacting with the learners, to take into account and to improve their emotional intelligence.

During the last decade it has been broadly realized that education in knowledge society (or smart society) is to pay particular attention to supporting and developing in learners the significant, independent skills called soft skills [24, 25] or transversal skills, including analytical and critical thinking, creativity, out-of-the-box thinking, and thinking and acting in terms of the public good.

Our starting motive was as follows. One of the significant social problems in modern Russia is that the most gifted and highly motivated students in high schools enter the leading universities in the biggest cities of the country (mainly, in Moscow and Saint-Petersburg), receive an excellent education and never return to their native towns and villages. A portion of them find jobs abroad. Consequently, the population of middle and small towns is diminishing.

In the beginning of 2017, we launched an all-Russian Web-based creative contest for school children entitled "Portrait of Your Town"; it took place for the nineth time in January through June 2025. It is a delicate opportunity for children from 14 to 18 years to tell about the beauty and peculiarity of their town, about living in the town, understanding their roots, perceiving themselves as the links in the chain of generations, to have a sophisticated look at their world and to take a personal look at the outstanding or usually unnoticed facets of their town—such facets without which, according to their opinion, the complete portrait of the country cannot be formed.

We indicate a spectrum of the themes' facets but not the theme itself. The children and adolescents participating in the main track of the school-contest are to ask the questions about the existence in their towns of such precious peculiarities that the portrait of the whole country would be incomplete without describing these peculiarities. The participants in the track "Say

Thank You" are asked whether there are such people in her/his surroundings that interaction with them turned out to be a defining experience for the participant. Children discover the delighting traits of character, the manner of speech, the ability to attentively listen to for a long time, etc.

After having been delighted, a child or an adolescent is to critically have a look inside herself/himself and ask herself/himself whether she/he possesses the traits of the character who delighted her/him and whether she/he wants to improve her/his character. The participants in the track receive the possibility to understand and to appreciate what they do know. We create a thought-provoking situation which stimulates children and adolescents to analyze facts, to think over, to develop critical thinking (when a schoolgirl or boy understands that she/he doesn't possess an attractive character trait). The transfer of an experience from one situation to another situation contributes in many cases to developing *cognitive flexibility*.

The brightest and most beautiful thoughts from the compositions of the winners of the school-contests in 2017 - 2025 were presented at eight exhibitions, entitled "The Country as an orchestra" (2018 and 2019) and "The portrait of the country by the hearts of children" (2020 – 2025) in the Federation Council of the Russian Federation (RF)—the upper chamber of the RF Parliament (called "State Douma"). The authors of the compositions were awarded the Letter of Gratitude signed by a senator (a member of the RF Federation Council) in accordance with a region of RF [26].

4.6 An Effective Starting Mechanism for STEAM Education

Dramatic diminishment of average creativity level of children and adolescents discovered in USA [27] caused a strong compensating impulse in education. The idea of the impulse was suggested by the well known fact: the brightest art works emerged as a result of creative acts of consciousness. As a result, the paradigm of STEAM education was born, where STEAM is an abbreviation for Science, Technology, Engineering, Art, Mathematics. Our analysis showed that STEAM education had in the 2010s no effective mechanism of supporting and developing creativity in kindergartens and elementary school [1, 2, 15]. That is why we suggested in [1, 2, 15] to use our method of supporting and developing creativity starting the age of five – seven (it is an important part of the Technology of emotional-imaginative teaching with the focus on up-bringing) as an effective mechanism of supporting and developing creativity in kindergartens and elementary school as starting component of STEAM education.

5 Contribution to Cognitive Psychology and Psychology of Development

5.1 Thought-Producing Self of the Child and Art Cognitonics

Our concept of thought-producing self (TPS) of the child and adolescent expanded and enriched the list of self-concepts considered in cognitive psychology and including, in particular, ecological self and interpersonal self, emerging by the ending of the first year of the child's life [28]. The concept of TPS and its use and significance for introducing children to computers is shortly described in the subsection 3.1 of the present paper. Art cognitonics characterized in the subsection 4.4 of the present paper enriched the world stock of the personality development methods.

5.2 Rich, Beautiful Language for Young Children

We discovered that the consciousness of five - seven year old children with normal, average capabilities needs of rich, beautiful language for expression the emotions evoked by the beauty of nature – a language being much more complicated than the language used for every day communication with the children of the indicated age [1, 2, 8, 22].

5.3 Addition of Three New Levels to the Basic Model of Consciousness Development

It seems that the model proposed by Zelazo [29] can be considered as a good working instrument for studying the development of conscious control during the first – fourth years of childhood. This model, called the Levels of consciousness (LOC) model, emerged as a result of reflecting the experimentally discovered regularities of the development of conscious control of thought, action, and emotion. The model describes three transitions from one LOC to another, higher LOC, these transitions depend on age.

It seems that the broadly felt necessity of promoting children's emotional and social competence in schools and the lack in the scientific literature of rather simple solutions to this problem are the grounds for putting forward the following conjecture: the levels of consciousness model proposed by Zelazo [29] indicates only some basic stages of consciousness development. The goal of creating appropriate theoretical foundations of promoting children's emotional and social competence will lead to discovering additional, higher stages of the child's consciousness development corresponding to mature emotional and social competence of the child.

Realizing this idea, let's give a new interpretation of the methods of developing conscious control of thought, action, and emotion described in [1, 2, 15, 22, 23] and belonging to the System of the Methods of Emotional-Imaginative Teaching. We'll suppose that these methods underpin the transition from the level of consciousness 4 (LOC 4) to LOC 5, from LOC 5 to LOC 6, and from LOC 6 to LOC 7. The new levels LOC 5, LOC 6, and LOC 7 will be respectively called *the level of broad beauty appreciation, the level of appreciating the value of thought, and the level of enhanced awareness of social agreements and social responsibility* [1, 2, 15, 22, 23].

A very short, preliminary description of these levels is as follows. Reaching LOC 5 by the person means that this person possesses a well-developed feeling of beauty in various manifestations: the beauty of a thing, of an idea, of an expression, of a picture or sculpture, of the interpersonal relationships, etc.

The successful transition from LOC 5 to LOC 6 means that (a) a child is aware of the fact that his/her ideas may be socially significant, i.e. the child may be appraised by the friends or adults for the originality and beauty of his/her idea; (b) a child appreciates the value of the thoughts of other persons. Reaching LOC 7 by a person means that this person is sufficiently mature

in the social sense, i.e. possesses an enhanced awareness of social agreements and social responsibility.

It should be underlined that modern preschool and school educational systems in various countries encourage only a rather small proportion of children to reach the 5th - 7th levels of conscious control. But to considerably increase this proportion is vitally important for successful socialization of children in knowledge society. Happily, at least one broadly applicable way of solving this problem has been available since the 1990s, it is given by the EIT-technology.

6 Conclusion

Due to the birth of Cognitonics two decades ago, the mankind has escaped a very dangerous cognitive trap. We believe that the essence of this trap is the following false *hope: more digital technologies imply le*ss people whose work is routine, monotonous, that is why the space of freedom, the space for creative work have been considerably expanded. Cognitonics drew attention to the necessity of noticing, analysing, and compensating the negative consequences of the digital technologies' stormy progress. The principal idea of Cognitonics is to support the human qualities in the human being.

Happily, the framework of Cognitonics has enabled the scholars to create the constructive educational methods aimed at supporting and developing emotional intelligence, creativity, social maturity, empathy, the ability to appreciate beauty in all its manifestations, the need of communication with nature, the comprehension of the necessity to appreciate and support national culture, the openness to the treasures of world culture, the ability to love a human being but not an emotional artificial intelligence companion, to create a family, the ability to see oneself as a link in a long chain of previous and future generations.

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The Impact of AI Tools on Students' Cognitive Processes in Practical Software Development

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Abstract

This study investigates how AI tools like GitHub Copilot and large language models (LLMs) affect cognitive engagement in high school students engaged in practical software and application development. It examines critical thinking, cognitive load, offloading, and motivation, exploring how AI can be used in education without undermining independent problem-solving skills. Grounded in Cognitive Load Theory and recent research on metacognition, the study integrates survey data with theoretical analysis to examine the cognitive and motivational dynamics of AI-assisted learning.

Keywords

AI-assisted programming, large language models (LLMs), cognitive load, cognitive offloading, critical thinking, metacognition, computational thinking, student motivation

1 Introduction

Although AI tools hold great potential in education, important questions remain about students' genuine understanding of generated solutions and their cognitive engagement. Prompt design reflects both the user's comprehension of the problem and the direction of AI output, illustrating the interplay between mental processing and external support. The implementation of AI-generated solutions further reveals levels of effort, autonomy, and understanding. Against this background, the study examines the educational implications of AI-assisted learning in programming, with particular emphasis on fostering deeper understanding and sustained motivation.

2 Research Design and Methodology

The study is grounded in Cognitive Load Theory and the concept of cognitive offloading, complemented by theories of motivation and self-determination. An online questionnaire was used, combining closed and open-ended questions about students' background, use of AI tools, behavior during implementation, understanding and cognitive processes, motivation, and the teacher's role. Participants were high school students from grammar and vocational tracks with access to AI tools in programming classes. Data were collected during lessons through a voluntary and anonymous online survey. Quantitative data were analyzed using descriptive statistics, while qualitative responses were examined through content analysis focusing on the link between AI use and cognitive engagement.

3 Theoretical and Conceptual Framework

3.1. Cognitive Load Theory

Cognitive Load Theory (CLT), first introduced by John Sweller in 1988, is based on the premise that human working memory has limited capacity and that excessive cognitive load can hinder the learning process [1]. Over time, the theory has evolved to distinguish between three types of cognitive load: intrinsic (the inherent complexity of the task), extraneous (the complexity added by the format and structure of instructional materials), and germane (the mental effort devoted to building and refining cognitive schemas) [2]. In the context of learning programming, particularly when large language models (LLMs) are involved it is essential to recognize how these technologies influence each component of cognitive load. LLMs such as ChatGPT can reduce extraneous load by providing easier access to information and concrete code examples. However, there is a risk that germane load may also be reduced if students rely on generated solutions without engaging in meaningful understanding of the underlying process.

3.2. Cognitive Offloading and Mental Effort

Cognitive offloading refers to the use of external aids such as notes, technology, or tools to reduce mental effort and increase efficiency [3]. While this role was traditionally fulfilled by calculators and written reminders, today it is increasingly taken on by large language models (LLMs) that generate ready-made solutions in real time. Risko & Gilbert (2016) emphasize that cognitive offloading can be beneficial when used to support thinking processes, but they also warn of the risks when it becomes a substitute for thinking itself [3]. It is essential to distinguish between strategic use of external aids which frees up working memory for higher-level tasks and passive reliance on tools that reduces metacognitive engagement and hinders deep learning. When students accept solutions without reflection or analysis, the cognitive loop necessary for learning is disrupted, weakening long-term knowledge retention.

Empirical evidence supports this distinction. Studies show that offloading can improve immediate task performance, but at

the cost of long-term memory and understanding if it is not accompanied by conscious cognitive processing [4]. Moreover, learners often choose to offload even when it is unnecessary, driven by low tolerance for cognitive effort or inaccurate self-assessment of their abilities [5]. Within the process of learning to program, this dynamic may manifest in the way a tool intended to support cognitive processing turns into a source of ready answers, bypassing independent reasoning. Over time, such patterns of behavior can restrict the growth of problem-solving abilities and autonomous thinking.

3.3. Critical Thinking and Independent Problem Solving

Critical thinking and independent problem-solving are essential cognitive abilities that enable the transition from rote learning to analysis, evaluation, and transfer of knowledge. In software development, this involves assessing incomplete information, selecting among possible solutions, and adapting during the creation process, requiring not only technical expertise but also cognitive flexibility and well-reasoned decision-making.

Empirical evidence indicates that integrating AI tools, such as GitHub Copilot and ChatGPT, can improve efficiency; Copilot users completed tasks 56% faster than a control group [6], and junior developers reported up to a 26% increase in weekly output [7]. However, GitClear's 2024 analysis showed reduced code reusability and increased revisions when AI-generated suggestions were accepted without review [8]. Nearly 45% of AI-generated code samples contained at least one known security vulnerability classified by OWASP [9]. There are also documented cases of unintentional sensitive data exposure due to poor understanding of code publishing [10]. Another concern is the model collapse phenomenon, where large language models recursively trained on synthetic or AI-generated content may lose variance and degrade in their ability to produce high-quality outputs [11].

These findings suggest that AI, when used uncritically, can amplify existing risks rather than mitigate them. From a pedagogical perspective, AI tools should not act as cognitive replacements but as extensions of reasoning processes, an externalized form of cognition. When used reflectively, they can foster comparative analysis, exploration of alternatives, and critical evaluation [12]. The key challenge lies in designing learning activities that integrate AI-assisted outcomes with independent reasoning and justification, with the teacher acting as a regulator of cognitive processes and a facilitator of metacognition, thereby enhancing deep learning while ensuring that technology supports rather than replaces essential cognitive functions.

3.4. Student Motivation and Self-Determination Theory

Self-Determination Theory (SDT), developed by Deci and Ryan (1985), identifies three fundamental psychological needs that promote intrinsic motivation: autonomy, competence, and relatedness. Meeting these needs increases the likelihood that students will engage in deep learning and sustain their effort over time [13]. In programming education, AI tools can increase the perceived sense of competence and, under certain conditions, autonomy by allowing students to independently choose problem-solving approaches and reach solutions more efficiently. Yet, intrinsic motivation may decline when a significant share of the cognitive work is transferred to the technology [14]. Brief episodes of increased motivation derived from successful task completion can help maintain engagement. When integrated into a structured, goal-oriented learning process, such moments can also contribute to long-term motivation and persistence [15].

Traditional strategies, such as systematic reading and analysis of existing code, for instance, examining and deconstructing open-source projects, remain effective for overcoming early challenges, encouraging reflection, and linking theory with practice [16]. In modern classrooms, AI-generated code can play a similar role. Students can analyze it, rewrite it, and reconstruct it from memory in progressively more independent ways, developing deeper understanding and more active learning habits. Used in this way, AI becomes more than a tool for speeding up task completion; it supports and facilitates active participation, independent decision-making, and competency development.

This approach aligns with the principles of the Student-Self Oriented Learning (SSOL) model, which frames education as a process in which learners, through emotionally engaging and conceptually guided work, take an active role in shaping their own development, posing self-directed questions, discovering meaning through personal experience, and building individual understanding [17]. Such a learning environment supports the maintenance of intrinsic motivation and fosters deep learning through active participation, self-regulation, and metacognitive strategies [18].

3.5. Synthesizing a Conceptual Model of Cognitive Processes

With the increasing integration of artificial intelligence in education, especially in programming instruction, it is essential to understand how these technologies influence students' cognitive processes. By linking psychological theories such as cognitive load theory, cognitive offloading, and motivation theories with principles underlying artificial intelligence (e.g., neural networks and deep learning), a conceptual model can be developed to explain the interaction between students, AI tools, and learning processes. One structural similarity is found in how deep neural networks process data through hierarchical layers, where each layer learns increasingly abstract features [19]. Similarly, students develop understanding gradually from basic syntax and code structure to higher-level abstract and reflective thinking [20][21]. Another point of connection lies in the mechanism of backpropagation, a core component of machine learning, which adjusts internal parameters based on feedback. In human learning, reflective error correction serves a comparable function in building deeper understanding. However, when students rely on AI tools to obtain ready-made solutions

without active cognitive engagement, this essential feedback loop may be bypassed, limiting the depth of learning [22].

In the field of deep learning, overfitting - the excessive adaptation to training data, reduces a model's ability to handle novel situations. In education, similar concerns have been raised in the literature about student knowledge that is formed without sufficient self-processing. When students repeatedly rely on external sources, such as AI tools, without processing the content themselves, their understanding may remain tied to familiar examples and fail to transfer to unfamiliar contexts Kirschner and van Merriënboer [22] warn that over-reliance on "cognitive shortcuts" like ready-made solutions can hinder the development of flexible, transferable knowledge.

Similarly, Spiro et al. [23], through Cognitive Flexibility Theory, emphasize the importance of multiple perspectives and learning strategies in ill-structured domains to avoid rigid, overly context-dependent knowledge. Within this framework, an AI tool is not simply a provider of answers, but can act as an external cognitive layer that complements the learner's internal cognitive structures and reasoning strategies. The impact of such tools depends on how students integrate them into their own thinking processes: they may support deep learning when used reflectively, or become shortcuts that bypass essential stages of cognitive development if used superficially.

4 Findings and Discussion

The survey results (N=131) show that the vast majority of students use ChatGPT as their primary AI tool for programming (77.5%), while GitHub Copilot is used by only 12.5%, and CodeWhisperer by 3.3% of respondents. Interestingly, one fifth of students (20%) reported that they do not use AI tools at all. These findings confirm the dominance of LLMs as the main form of cognitive offloading in the classroom. Regarding solution implementation, a considerable share of students (38%) reported that they first attempt to solve the problem independently before asking AI for help, while 31% stated that they at least try to understand the generated code before applying it. Only a small portion (around 15%) admitted to simply copying and running the code. This distribution indicates that most students use AI not as a final provider of solutions, but as an auxiliary tool in the learning process, which aligns with the principles of cognitive offloading. However, perceptions of their own thinking process are more ambivalent: about 41% of students feel that using AI bypasses their own reasoning, while one third disagrees with this claim. This suggests a risk that some students may develop a habit of shifting cognitive responsibility to the external tool, potentially weakening deeper learning.

The motivational effects of AI are evident: more than 70% of students stated that obtaining a correct solution through AI motivates them to continue working, and 68% believe that AI helps them progress faster. At the same time, nearly 30% of students admitted that their motivation decreases if they do not immediately obtain a correct solution, which points to dependence on external validation rather than the development of intrinsic motivation.

The teacher's role remains crucial: nearly 80% of students agreed that the teacher is necessary to ensure that AI use genuinely contributes to learning. In open-ended responses, students most often emphasized the need for detailed explanations of AI-generated code and for additional tasks without AI, confirming that teachers play a decisive role in directing AI use towards the development of cognitive autonomy. Overall, the findings suggest that students are shaping a complex relationship with AI tools: on the one hand, they serve as a stimulus and catalyst for learning, while on the other hand they may foster superficial understanding and reliance on ready-made solutions. The decisive factor in maintaining this balance remains teacher guidance and the structure of tasks.

Table 1: Frequency of AI tool usage among high school students

Area	Key Results	% of Students
Use of AI tools	ChatGPT	77.5%
	GitHub Copilot	12.5%
	CodeWhisperer	3.3%
	Do not use AI tools	20.0%
	Other AI tools	6.7%
Approach to AI-generated code	First try independently, then ask AI	38%
	Read and try to understand before use	31%
	Modify and test multiple versions	16%
	Just copy and run	15%
Perception of cognitive process	Feel that AI bypasses their thinking	41%
	Do not agree	~33%
Motivational aspects	AI solution motivates to continue	70%+
	AI helps to progress faster	68%
	Motivation decreases without immediate solution	~30%
Role of the teacher	Teacher needed to use AI meaningfully	~80%
	Detailed explanation of AI-generated code helps	41%
	Additional probing questions help	44%
	Assigning extra tasks without AI helps	8%

5 Implications for Educational Practice

The use of LLMs in learning programming activates intensive cognitive processes which, with sufficient time for consolidation, can stimulate the development of cognitive reserve and neuroplasticity [24][25]. Results of the survey conducted among high school students indicate that AI tools are not used solely for obtaining ready-made solutions but are at times integrated into processes of understanding and questioning, opening the possibility for developing cognitive flexibility and metacognitive learning. At the same time, prolonged reliance on ready-made answers may lead to the accumulation of cognitive debt [26]. More than half of the students (54.96%) did not reject the statement that using AI might bypass their own thought process, suggesting ambivalent attitudes and confirming the need for clear pedagogical guidance (see Figure 1)

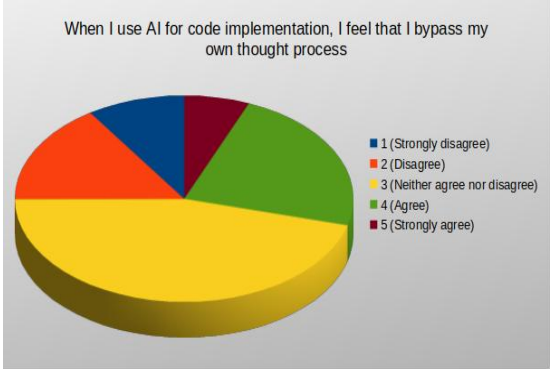

Figure 1: Students' perceptions of bypassing their own cognitive processes when using AI tools

6 Conclusions and Future Directions

The integration of AI tools into software development education has revealed a dual trajectory: on the one hand, it enables accelerated knowledge acquisition and the development of cognitive reserve, while on the other, it requires careful pedagogical guidance to prevent the bypassing of essential thinking processes and the erosion of authentic understanding. Research findings indicate that new generations of students already use AI seamlessly in their learning practices, with their cognitive processes adapting to the pace of the digital environment. This transformation also introduces new challenges – from questions of academic integrity and knowledge authenticity to potential misuse through identity theft and the sharing of sensitive data.

In this context, the role of the teacher acquires a new dimension: from being a subject-matter expert to becoming a digital pedagogue who understands how AI generates content, recognizes its limitations, and guides students toward reflection, metacognition, and critical examination. Continuous professional development in digital pedagogy therefore becomes a necessary prerequisite for ensuring meaningful learning and safeguarding students in the digital sphere.

Looking ahead, we face generations whose cognitive development will unfold in constant interaction with artificial intelligence. Such an environment may foster new forms of neuroplasticity and cognitive flexibility, but it also carries the risk of shallow cognitive development if reflection and independent problem-solving remain overshadowed by ready-made solutions. The future of education, in this sense, is not merely a technological issue but also a matter of shaping human consciousness, balancing the power of digital tools with the preservation and strengthening of what makes us human: critical thinking, creativity, and ethical responsibility.

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The Language Games for Living Alongside Institutional Artificial Persons which Employ Artificial Intelligence*

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Abstract

The Fourth Industrial Revolution is well on the way to producing artificial general intelligence and has already produced advanced cyber physical systems that are disrupting economic and social systems nationally, internationally and globally. The organisations producing or employing such systems are treated as artificial persons under the law. Artificial Personhood has certain features which allow for ownership of resources and the right to act in the world. As there is a marked asymmetry between natural and artificial persons under the law, there is an urgent need to find new ways of accommodating and respecting each other in these disruptive times. This paper explores the need for good citizenship between natural and artificial persons and proposes a means to achieve it.

Keywords

Artificial intelligence, generative artificial intelligence, artificial person, cognitonics, young generation, personality development, education, fourth industrial revolution

1 Introduction

We will reference a successful societal development from the first industrial revolution [1], a new form of schooling for working children, to inform an approach to working with institutionalised agents of the fourth industrial revolution [2]. We work from the social contract theory introduced by Hobbes [3] and note that the school estate is an essential element of any healthily functioning social contract. Through this social contract we present a means of linking between schools and society at large, in a form of *cognitive tunnelling* [4] that allows behavioural expectations to be tested by pupils as they study their school curriculum. In the method suggested here, the curriculum elements of pupils can be matched to debates and actions taking place in the real-world.

Our primary areas of concern are with developments and regulation of Artificial Intelligence (AI), Generative Artificial Intelligence, the oncoming forms of Artificial General Intelligence, and the distortions that may be made in the living conditions of young people as they make their way through the education system and enter in to the job markets of the world.

In a very preliminary way, the paper proposes a workable metaphorical and cultural methodology that allows concerned human beings who wish to shape this era of the Fourth Industrial Revolution, to frame and address troubling issues of the fourth industrial revolution.

There have been powerful moves in the direction of questions of regulating AI or whether it will be best to allow a free hand to technical development at this important moment in the fourth industrial revolution. The scale of the challenge of this moment of reckoning between the young of the world and the technologists developing the most powerful socio-economic tool in industrial history can be addressed from a cognitonics perspective where we attempt to provide a means of understanding this crucial social, historical, technological and political moment by involving all stakeholders in understanding and decision-making. The ultimate aim is to provide a compelling metaphor for addressing the difficulties of the Fourth Industrial Revolution and mastering them.

We employ a philosophical approach [5] that provides Hobbesian interpretation [3] of Beer's Viable System Model (VSM) [6] that exploits the strengths of both implementations and consequently allows us to note any institutionalized organisation as an artificial person (an IAP) at work within society. Each societal IAP is expected to obey the social contract that it inherits as an institution within its agreed field of activity.

2 A Dancing Metaphor From The First Industrial Revolution

Let's remember Robert Owen's four essays on "A New View of Society" [1]. In the first essay he described the principles that had developed in his Mill which led to harmonious living. In the second, he described the difficult

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situation he inherited on purchasing the Mill. In the third he noted ongoing plans for more harmonious development at the Mill, and for working people of the First Industrial Revolution in general. And in the fourth, he described how government could legislate and develop laws for humane societal development. The scope of these essays shows Owen evolve into a social activist and societal advocate.

In the second essay, where he described the conditions of his workforce when he came to become owner of the New Lanark Mill, there are a number of points to note.

1. The New Lanark Mill was sited beside a powerful waterfall and not near a local population, therefore workers had to locate to the new site with their families. The working hours of the Mill were 6am till 7pm. As adults could not be found to fill the roles, children were also employed in the Mill. Approximately 50% of the workforce were children.
2. The previous owner took children from orphanages for the child workforce. The charities who supplied them would only allow him to take children of 6, 7 and 8 years of age. By the time Owen arrived, children, who had been working 13 hour shifts from a young age had been developing poorly both physically and mentally. We also note that the working conditions that caused the situation were legal, within the law of the time.
3. The previous owner did not live on site, and there were problems that arose in sectarianism, caused by austere social conditions; thefts caused by poverty; and drunkenness at work, causes by issues of hopelessness.
4. It took careful efforts to turn these conditions around. The work involved noting each situation, addressing each situation and engaging humane means of understanding and correction. These means are described in essays 1, 3 and 4 of the book.

It is clear that the plight of young people in particular at the beginning of the first industrial revolution was of deep concern. It was clear that laws and societal mores needed to change. The fact that Owen made his living from the disruptive First Industrial Revolution, addressed questions raised by the disruptions to society, and offered perspectives on societal change makes him a viable candidate to learn from in our own disruptive and revolutionary times.

In order to achieve success, Owen had to take what we may call *a cognitonics approach to the living, working and social characteristics* of his workforce, and their children, at the New Lanark Mill. A major innovation at the mill was a school, which he named the “Institute for the Formation of Character”.

The success of the school was in focusing on educating the youngsters using everyday familiar items, then on expanding the reach of their understanding, and finally on to the arts, geography, science and business. Owen’s school invited visitors to visit and observe lessons. From a Hobbesian perspective, he acted perfectly within the social contract of the state in providing the school, he had the authority to apply the teaching methods, and to monitor their results for development and improvement.

As regards sustainability of the educational enterprise, he had to engage teachers, develop a curriculum, find a space for delivery of the lessons, monitor the efficacy of the education, engage in improvements, and then open the model up to scrutiny. We note that, legally, Owen was under no obligation to provide education for the children. Owen worked within the latitude allowed by laws of the time and his school at New Lanark was acceptable to the state.

The State and its Functions, seen as a House with Many Mansions, each are essential to the state, and may have a role to play in any institutionalised activity permitted by the state. We draw out here the activity of the lesson within the body of the state. We now have a first metaphor for envisaging how various different institutional entities are legislating simultaneously to provide harmonious cooperation within the state, even as the state is operating, and occasionally being disruptively challenged by changing societal mores.

We note that in the UK, parliamentary oversight of a school in the UK in the 21st Century has to satisfy many more branches of government, now 24, and the agents of the school all have a distinct social contract along which they can be monitored and regulated. Therefore, we know the authorities and the limits to the authority of any institutional actor at work in a state school.

3 Urgent Questions From Youth In The Fourth Industrial Revolution

We have noted the compelling questions raised by the disruptive introduction of Mills during the First Industrial Revolution, and questions of the new devices of the Fourth Industrial Revolution have already been raised.

Our modern governments which still follow a three-branch sovereignty of executive, legislative and judicial branches have many more top-level departments which oversee the day-to-day operations of the state. Currently, in the UK we have twenty four departments. We can therefore imagine modern house of many mansions, one for each of these key department of the state, overseeing the educational situation.

The modern observation of the educational space depicted has these departments overseeing correct decorum of the operation space under consideration. In particular we note:

1. The operational space is well defined, as before. All Institutional Artificial Persons can be identified, and their behaviours measured against professional expectations. The school curricular activities, and the supporting institutional activity within are well defined, and scoped within an institutional setting.
2. We can group together each of the elements of the branches of government that have something

to say about that institutional setting, and therefore understand what behaviour is expected from each of the institutional agencies involved. Should any of the elements of the educational setting, be replaced with ALAPs, we can also note what behaviours are expected of any ALAP at work in the operations space.

3. We can be clear of the bureaucratic requirements, monitoring requirements, resources and laws applying to institutional agencies at work in the space. Therefore, for any black-box device that is at work, there is no real need to know how it produces its behaviour. It is however important to note the behaviour and challenge it where necessary: firstly at the institutional level.

With this metaphor of state and operations within the state, we can turn to urgent issues being raised by youngsters as regards the introduction of agents harnessing generative AI capabilities among the already recognisable artificial persons of the institutions of the state. We also highlight that the importance of young people in our society has been greatly enhanced since the beginning of the 18th century.

To this end, we highlight the work of school-age citizens, such as Greta Thunberg at the age of 15, whose poetic and pragmatic response to the world around her caused a dramatic increase in concern on the topic of climate change and climate activism. We look to the work of Sneha Revanu, a Californian who also started campaigning at the age of 15, by starting an organisation to highlight the dangers of unregulated AI. Sneha Revanu has been called the Greta Thunberg of AI. Her startup, Encode AI, has flourished into a youth oriented movement that, among other campaigns, endorses an AI regulation campaign, called Encode Justice 2030.

The acclaimed campaign draws the world's attention to the fact that the world as it is being changed today will be lived in by the young people of today, and that the young should have some say over the actions of governments, private institutions and public institutions as they develop AI agents and employ them in society.

We note that the 22 points raised in 5 main headings in the campaign directly address IAPs. We list the key questions here:

1. Build trust and human connection

a. Governments should mandate clear and continuous disclosures of AI-generated political advertising.

b. Companies should identify and limit the spread of deepfake content

c. Governments must protect free speech and opportunities for anonymity.

d. Companies should label AI outputs with a well-established warning symbol or label and explicitly disclose the model of origin

e. Companies should ensure that AI systems present clear and continuous indicators that users are interacting with a machine, not a human.

f. Companies should allow users to opt out of being subjected to an embedded AI system

g. Companies should offer users agency and ownership over their personal data

h. Governments should fund public education programs that train people to make thoughtful choices about their interactions with AI.

i. Public and private actors should make a large-scale investment in research and technical solutions, built from the ground up, to defend trust and truth.

2. Protect our fundamental rights and freedoms

a. Governments should mandate publicly available impact assessments for rights-impacting AI systems.

b. Public and private actors should actively monitor the real-world impact of AI systems once deployed

c. Governments must empower us to seek meaningful redress when such a system is shown to have violated our rights

d. Governments should fund technical research on bias detection and mitigation.

3. Secure our economic future

a. Governments should redirect R&D investment to AI applications whose fundamental purpose is to enhance, not supplant, human capabilities and potential over time.

b. Governments should form a global retraining fund.

c. Governments should be willing to consider bold, innovative policy ideas if we arrive at economic conditions that necessitate a more dramatic response.

4. **Ban fully operated weapons of destruction**
    a. Governments should ratify an international treaty that prohibits the creation, manufacturing, and deployment of fully autonomous, offensive weapon systems that lack meaningful human control.
    b. Public and private actors should invest in AI applications that encourage peacekeeping and conflict resolution.
5. **Cooperate for a safer today and tomorrow**
    a. Collectively, Governments should establish a global authority to minimize the dangers of AI, particularly foundation models.
    b. Collectively, Governments should create a global institute for AI safety that employs the world's top scientific talent
    c. Collectively, Governments should ensure that the benefits of AI are more evenly distributed and lessen global environmental harms.
    d. Individually, Governments should create domestic rules of the road aimed at preventing hazardous outcomes

Kane [4] showed how pupils in the Glasgow school estate were able to engage with real-world agencies and learn from them as they pursued their education. The same means of contact, with agreed terms, citing the curricular level of the pupils involved, and engaging with the external organisation on one of the topics above, could generate a great deal of debate and understanding of the true issues at stake in each of these topics. Furthermore, as any year-group of a state education system can be collectively described as an artificial person that contains all of these students, there is an opportunity to collect the considered opinions of all these students and deliver them directly to important stakeholders and legislators.

4 A Preliminary Cognitonics Framework and Metaphor to Pursue Harmonious Integration

We have focused upon the famous dance scene from Robert Owen's school, which he called "The Institute for the Formation of Character". However, this operations space could be substituted for any other field of activity that involves advanced tools of artificial intelligence, and calls for a just reckoning with the social contract. Therefore, we could swap out the classroom operational and apply it to other operational spaces directly.

Instead of a school lesson we could explore such topics as any of the 22 calls from Encode AI in an appropriate activity space. We can envisage each of these points as the leading statement of a debate and directly involve young people in the running of the debate. These debates would have different complexities and efficacy depending on which part of society is engaging with young people.

1. The provision of free and fair elections – elucidating all actors involved and the institutional engagement of generative AI agents in the electoral process
2. The handling of private and personal human information by AI agents and the institutions which have access to their reasoning and datasets
3. The human impacts of business or governmental engagements in particular operational spaces of society on those who are uninformed stakeholders in that operation space.

5 Conclusion

This paper proposes a preliminary means of addressing questions of the Fourth Industrial Revolution firstly, from an educational perspective, and then from an operational perspective that includes all of the stakeholders of the operational domain, along with the social contract they operate under, which, importantly highlights their rights and responsibilities in the operational space.

When it comes to discussing the issues that are raised, there are many educational environments where this can be done. If a societal effort is made to link these educational spaces to places in the real-world where issues arise, then our real-world education systems will be advanced. If we develop a means for connecting the concerns and insights of young people with legislative processes, allowing the participating students to be heard and involved at legislative level, then we will be expanding the horizons of participative democracy, and involving the voices of young people in decisions that will affect their future world.

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